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ARCHITECT & CONSTRUCTOR

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Ninety-Eighth Year.

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VOL. CLIX SEPTEMBER 27 1940 No. 5095

EVACUATION AGAIN

THE indiscriminate bombing attacks on London have brought home to us with grim reality the disadvantages and dangers of unrestricted urban development when war comes with an utterly unscrupulous enemy. For years the town planners opposed, with every argument that reason could command, the outward sprawl of London, and urged the need for the decentralisation of industry and the creation of satellite towns. But local authorities, "big business" and transport companies were not to be convinced. The temptation of immediate gain to all from the closest possible proximity to the greatest centre of human activity in the world was too much. It need only be said that if the voice of reason had been listened to as lately as the end of the last war we should not now be presenting to the enemy a mass target comprising one-fifth of the population of the whole country.

In the middle of a war it is a difficult operation to transplant well-rooted industry and to disperse population, but clearly some attempt must be made quickly to reduce the dangers which our great aggregations of both have produced in the Metropolitan Area. As to industry, it were wiser to say nothing, but as to population, particularly that part which cannot be of help in the war effort, the possibilities are considerable and have yet to be thoroughly explored.

The comparative failure of the first evacuation scheme was due to a variety of causes which there is now no need to examine, though it may be said that the principal defect was the lack of convenient or planned accommodation. That difficulty could have been overcome during the first nine months of the war if there had been the vision to see the need and the will to supply it, both of which, however, were lacking.

The immediate task is to evacuate those who need not remain in the danger areas, particularly mothers and young children, and in this connection we would draw special attention to the Fourth Report of the Evacuation Committee of the A.A.S.T.A., which has just been issued under the title of "Evacuation: The 'Under Fives.'"* A summary of its proposals was given in our last issue, and this week we publish some extracts from it relating to the construction programme suggested, together with a selection of the designs for various types of building required.

The Report makes it clear that the most suitable type of existing accommodation is the large country house, and it is estimated that approximately three-quarters of a million children could be sheltered, with their mothers, in country houses with ten or more rooms in what are regarded as safe areas. Alterations and additions, mainly to lavatory and kitchen accommodation, would be necessary in most cases to make these houses suitable for their purpose, but the materials and equipment needed are thought to be fully available and the work should not take long to complete. The Report includes sketches showing alternative accommodation developments around a typical country house.

The chief technical interest of the Report is found in the types of new building suggested and the methods of construction adopted. The buildings include hostels, crêches, day nursery schools, residential nursery schools, family cottages, maternity homes, etc., for all of which there would be a peace-time use. A big building programme is clearly involved and it is almost certain to be objected that materials and labour are not available for it and that the cost is prohibitive. These objections are anticipated by the authors of the Report, who point out that the building programme is based on three principles: (1) Avoidance of imported materials; (2) avoidance of materials required for urgent war purposes (such as steel and other metals, timber, etc.); and (3) avoidance of site labour of a skilled kind.

To simplify the work the designs are all based upon a "structural plan unit," and buildings are limited to one storey. Floors and walls are of normal materials, while for the roof the alternatives are suggested of (1) a self-centering block arch on continuous solid cross walls; and (2) a pre-fabricated plaster arch and beam and pier construction, the latter being preferable as it allows freedom of planning. Window frames would be of pre-cast concrete, moulded plaster or slate, with glazing; doors, hardwood frames with glazing or of fully compressed asbestos-cement sheeting.

The cost is estimated at £100 to £140 millions for a programme serving the needs of 2,000,000 evacuees. This is not perhaps excessive in relation to the immediate advantages, and when it is remembered that the buildings would form a permanent asset, bringing lasting benefits to the community.

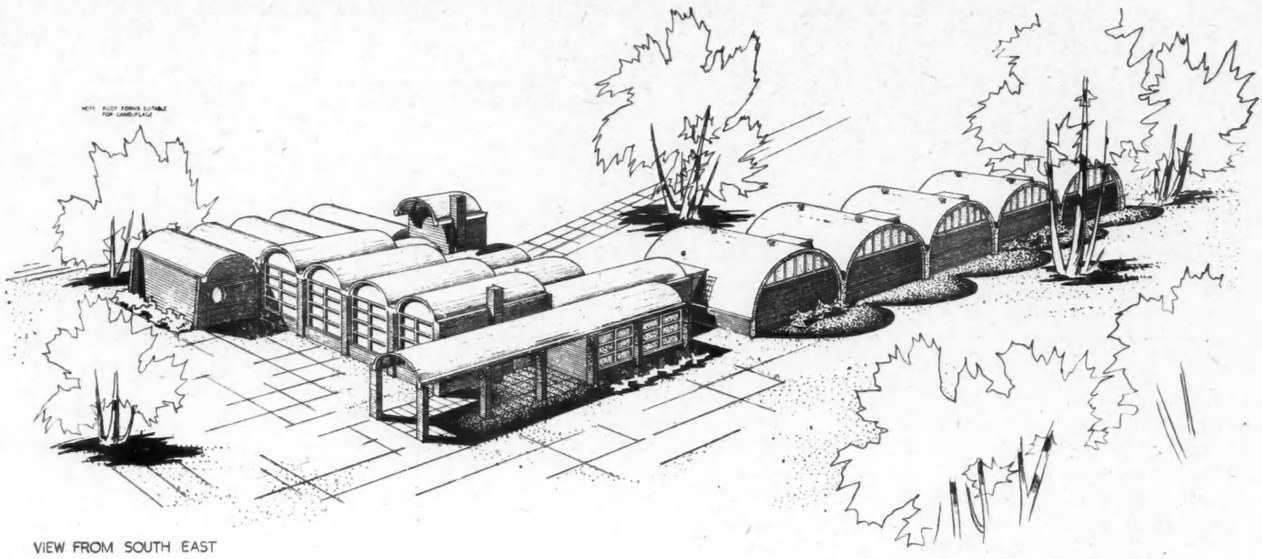
The type designs have been prepared by individual members of the Committee and all have been drawn by Mr. Birkin Haward, A.R.I.B.A., who deserves special commendation for the excellence of his work.

Obviously an immense amount of thought and hard work has been put into this Report. It is a really constructive document that deserves very careful consideration from our governing authorities, to whom it has been submitted. It need hardly be added that whatever it is decided to do must be done quickly.

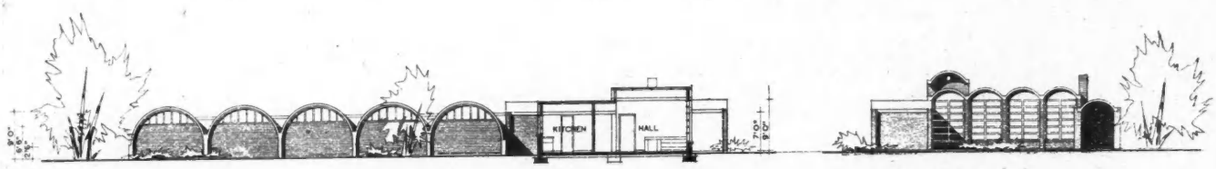
* A.A.S.T.A., 113 High Holborn, W.C.1. Price 6d. (7d. post free).

4 RESIDENTIAL NURSERY SCHOOL DESIGNED BY BIRKIN HAWARD A.R.I.B.A.

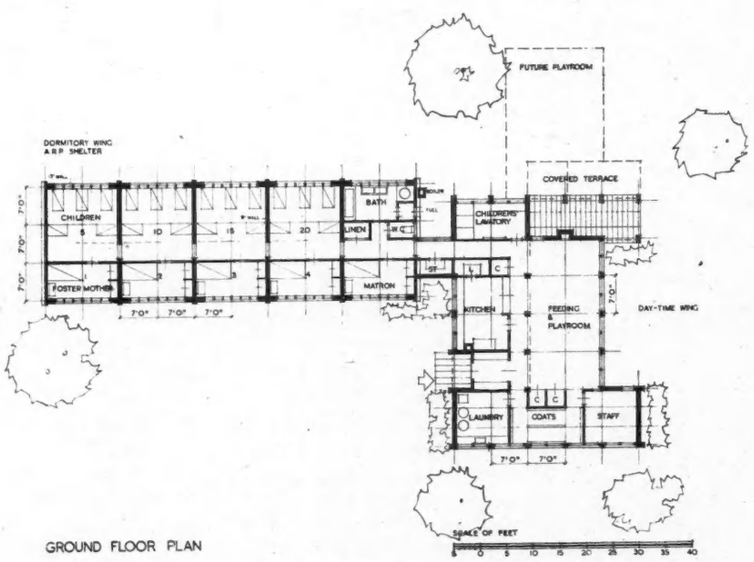
20 CHILDREN, 2-5 YEARS, 4 FOSTER MOTHERS AND MATRON



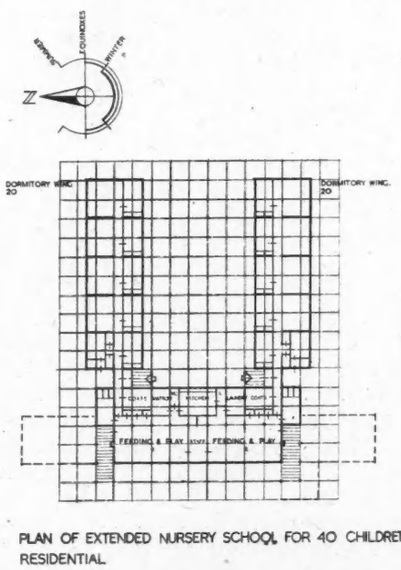
VIEW FROM SOUTH EAST



WEST ELEVATION CROSS SECTION SOUTH ELEVATION



GROUND FLOOR PLAN



PLAN OF EXTENDED NURSERY SCHOOL FOR 40 CHILDREN RESIDENTIAL

This design for a Residential Nursery School, by Mr. Birkin Haward, A.R.I.B.A., is from the Appendix to the new Report on "Evacuation : The 'Under-Fives'", produced by the Association of Architects, Surveyors and Technical Assistants. The Report is the subject of a Leading Article on page 301.

NOTES AND NEWS

Private Enterprise Building Control Order.

On October 7, a Private Enterprise Building Control Order will come into force, known as Defence (General) Regulation No. 56a. Following is the essence of the scheme, which will be more fully explained in our next issue:—

By an Order which takes effect from October 7, 1940, no work of building or civil engineering construction may be undertaken without consent from the appropriate authorities. The object of this Order is to conserve labour and materials urgently needed for the war effort. The Order is subject to the following exceptions:—

1. Where the estimated cost does not exceed £500.

2. Where the work is being done on behalf of, or under contract with, a Government Department; or where a Government Department has agreed to pay all or part of the cost.

3. Where the work is being done by a local authority in discharge of its functions under the Civil Defence Acts, 1937 and 1939.

4. Where the work is in the nature of maintenance, running repairs or decoration.

How to Apply for Consent.—An explanatory Memorandum has been prepared, obtainable from the Licensing Officer, H.M. Office of Works, Abell House, John Islip-street, London, S.W.1.

Consent will generally take the form of a licence issued by H.M. Office of Works. In the case of certain building or constructional operations carried out by local authorities, highway authorities, public utility companies, and of operations in connection with mining and quarrying, consent will take the form of an Authorisation issued by the appropriate department.

Importance of Early Application.—Anyone intending to undertake building or constructional operations for which consent is necessary under the Regulation should apply *at the earliest possible date*. Failure to do this may involve wastage of time and labour, or postponement or alteration of plans.

Work Already in Progress.—In the case of building or constructional operations already in progress on October 7, 1940, and of which the estimated cost of completion exceeds £500, application for consent to continue must be made not later than October 21, 1940.

For the purpose of granting licences, twelve regions have been established, each with a Licensing Officer. The Order makes clear, however, that application for controlled materials is still necessary, even though consent (by licence or authorisation) has been obtained. The Order applies to Scotland. Northern Ireland will be the subject of separate instructions.

F. C. M. Chancellor, F.R.I.B.A.

The death has taken place at Gerrards Cross of Mr. Francis Graham Moor Chancellor, F.R.I.B.A. Mr. Chancellor, who was assistant to and afterwards partner of the late Frank Matcham, was widely versed in theatre and cinema design, and executed many such buildings in London and the provinces, the best known, perhaps, being the new "Empire," in Leicester-square (in association with T. W. Lamb, of America). Mr. Chancellor, who was 70, joined the R.I.B.A. in 1928.

"Programme for Victory."

The series of lectures on this subject, arranged by the Fabian Society on Thursdays from October 3 to November 7 inclusive, will be held—owing to "black-out and blitzkrieg"—on the Saturday afternoons following, at 2.15 p.m., at Central Hall, S.W.1.

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Damaged Buildings.

The list of buildings of historic or other importance in London damaged by the enemy during the past week includes the Library of the Inner Temple, said to have been severely damaged structurally but little harm done to the books; County Hall, where the terrace was struck and some damage done to the interior of the buildings; the British Museum, where superficial damage, mostly broken glass, was caused; a number of big stores in the Oxford Circus region, including Peter Robinson's, John Lewis's, and D. H. Evans; and many architects will also hear with profound sorrow that the Arts Club in Dover-street has been demolished, though fortunately there were only two casualties, two male members of the staff being killed, the other 19 occupants escaping. That delightful composition, Portland-crescent, has also suffered, two of its houses having been brought down. The Tate Gallery also has suffered badly from broken glass, but staff and pictures are safe. Two of the Courts of the Law Courts in the Strand have been damaged.

Provision of Air Raid Shelters.

Sir John Anderson, in the House of Commons last week, stated that local authorities had been urged to press on as rapidly as possible with the provision of air-raid shelters by one or other of the expedients of which they had been given particulars. His department would continue to do everything in its power to ensure supplies of necessary materials, subject to the competing claims of other services. As to cement, Sir John Anderson said that all he could do was to press, as he had done vigorously, the requirements of civil defence, but he must accept such decisions as were taken by the appropriate authorities.

"Railings for Scrap" Exhibition.

Owing to current conditions, the Exhibition of "Railings for Scrap," arranged by the London Society, has had to be cancelled.

Professional Announcement.

Messrs. Henry Tanner have asked us to state that as from September 29 next their West End office will be closed and their business will be conducted from their City office, No. 134, Fenchurch-street, E.C.3.

COMING EVENTS

Saturday, September 28. Institution of Structural Engineers (Yorkshire Branch).—Chairman's Address by Dr. R. H. Evans, Hotel Metropole, Leeds. 2.30 p.m.

Tuesday, October 1.—Housing Centre Tuesday Lunches: Mr. H. G. Griffin, General Secretary, Council for Preservation of Rural England, on "The War-Time Work of the C.P.R.E." 1 p.m.

Thursday, October 3—November 7.—Fabian Society. A series of autumn lectures on Thursday evenings at 6 p.m., at the Central Hall, Westminster, S.W.1.

CORRESPONDENCE

[While we are glad to publish letters on professional and other matters of interest to our readers, it must be understood that we do not necessarily endorse the remarks of correspondents, who will oblige us if they will express their views as briefly as possible.]

R.I.B.A. Industrial Housing Competition.

To the Editor of *The Builder*.

Sir,—I have read with great interest in your issue of September 13 the admirable note on this competition. Admirable as it is, however, it has as a defect that it does not, as they say, give credit where credit is due.

Privileged to act as the bearer of the offer of the donor—Mr. Bertram Baden—of the sum of £750, out of which the various awards were made, and charged with the duty of explaining the conditions, very few and simple, that he laid down, I came intimately in contact with those of the R.I.B.A. who undertook the responsibility of arranging the competition and acting as judges. What struck me in particular was the expedition shown by everybody concerned in setting about and completing the task.

The primary aim of Mr. Baden was less to assist architecture than in these difficult times to be of assistance to architects. This, those with whom I had discussions at the R.I.B.A. recognised, and the manner in which they ensured in the competition both should be served was most impressive. Individuals prominent in this connection, in addition to the President of the Institute, Mr. Ansell, and the Secretary, Sir Ian MacAlister, were Mr. Kenneth Cross, Mr. J. H. Forshaw, Mr. G. A. Jellicoe and Mr. R. Fitzmaurice, the last-named being the four who shouldered the task of adjudicating upon the 159 entries. Probably it was because it would have been inappropriate that there was no mention of these names in your note and no recognition of the services rendered. Myself, I should, and I am sure Mr. Bertram Baden also would like to have such mention gratefully made, and if you could see your way to do so by giving space to this letter or otherwise it would be greatly appreciated.

Charles Porter,
(Dr. Charles Porter, formerly Medical Officer of Health, St. Marylebone).
London, N.W.1.

IN 1915

Extract from *The Builder*, September 24.

"Among the most intricate problems for our statesmen to settle arising out of the course of the present war is finding out adequate measures with which to meet injustice done. The German Government apparently has no regard for the private property of its enemies. . . If adequate compensation in the shape of a direct indemnity is impossible, we hope it will be feasible to exact an equivalent in kind for such ruthless acts. . . ."

WAR-TIME BUILDING PRACTICE

By R. Cotterell Butler, A.R.I.B.A.

30.—INDUSTRIAL PLANNING AND DESIGN.

EMERGENCY FACTORY CONSTRUCTION: DIRECT HIT AND "NEAR MISS" RESISTANCE.

AFTER a month of intensified air warfare it has become possible to draw certain conclusions from the observed effects of H.E. and incendiary bombing in this country—observations which considerably augment, and to some extent modify, the primarily theoretical information at our disposal before the war. These conclusions have an important bearing upon those factors which control the design of industrial buildings generally.

Industrial building constitutes a legitimate military objective, and it would appear only reasonable that the further industrial development necessitated by the war-material and export drive should be carried out with every attention to such conclusions as may be drawn from recent practical experience.

Whatever their location, industrial buildings must be considered liable to more intense attack than other war-time developments, such as those occasioned by evacuation or similar measures. Therefore a high resistance to the effects of high-explosive and incendiary bombs and ease of repair after partial demolition should be considered primary design considerations.

"SHELTER FACTORIES."

In reviewing the possibilities of designing emergency industrial structures in such a way that they will suffer the minimum of damage from the effects of blast and splinters, arising out of direct hits or near misses, it is important to bear in mind a consideration which does not arise directly out of technical factors.

At this stage of the war it would appear to have become necessary for industrial workers in certain districts exposed to frequently occurring air attack to continue at work, if not actually during an attack in the immediate vicinity, at least while the possibility of such an attack developing continues to be imminent. Under these circumstances, it would seem desirable that some measure of protection should be afforded by the fabric of the industrial structure itself, since the morale of operatives would be vastly better working under such conditions than where they might feel that the structure around them offered little or no protection compared with their shelters.

Now, it by no means follows that the type of building which is best fitted to withstand the effects of direct hits or near misses is also that which will offer the best protection to the worker.

It might generally be supposed that an industrial building, the fabric of which was equal to that laid down by the Code, would be a solution to both these problems. However, quite apart from economic considerations, this is not the case.

PERSONNEL PROTECTION: THE AREA FACTOR.

The degree of safety of any individual during an air-raid is determined not only by the standard of resistance afforded by the fabric of the structure in which he is sheltering, but equally by the area of the shelter. The smaller the area of the shelter, the nearer must the individual be to the centre of the explosion for it to represent a direct hit. Therefore it follows naturally that the smaller the shelter unit, the less the possibility of a direct hit being scored, and on this basis—other factors considered equal—the greater the safety.

Assuming any factory building of more than minimum size, and that the construction of its walls and roof are equivalent to the Code standard of resistance; in order that this may afford shelter equal to that provided by the actual air-raid shelters, internal sub-division must be provided to reduce the maximum area of any given cell. Otherwise, a projectile scoring a hit at one end of the building and the blast-pressure from the explosion being restrained by the outer walls, a considerable component of the explosion would be propagated throughout other parts of the structure.

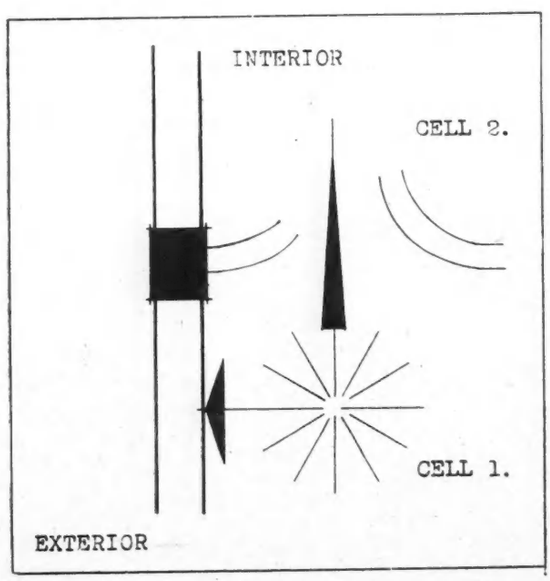


Diagram 1a.—Resistance of external wall greater than internal division wall. Explosion propagated internally to Cell 2.

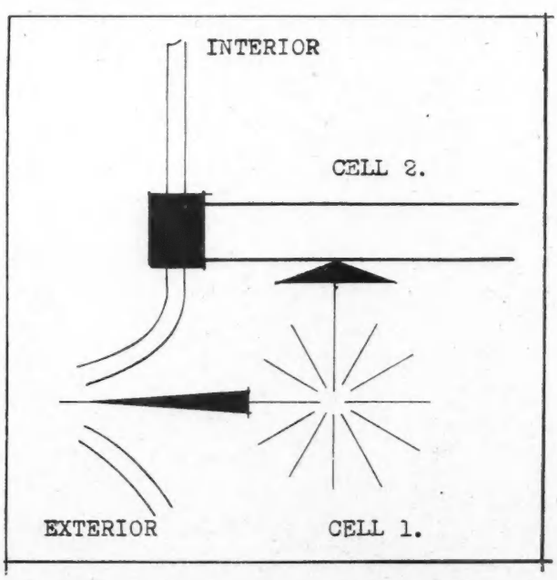


Diagram 1b.—Resistance of internal wall greater than exterior wall. Explosion blows out the exterior, tending to prevent extension of damage to Cell 2.

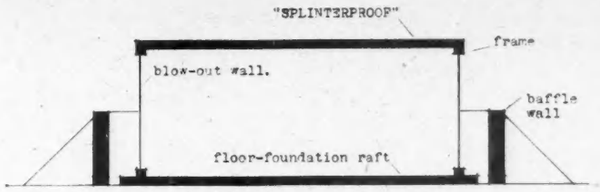


Diagram 2a.—Shelter-factory section (surface type).

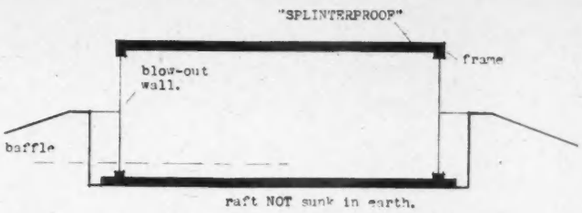


Diagram 2b.—Shelter-factory section (sunk type).

STRUCTURAL RESISTANCE.

The resistance offered by a structure to the effects of direct hits or near misses is determined by its ability to withstand the three components of an explosion: movement transmitted through solid matter (commonly known as shock wave), that transmitted through or by the air (blast), and the disruptive or penetrating effect of missiles either thrown up by the explosion or consisting of parts of the bomb case.

Shock: A considerable number of the bombs dropped in this country up to the moment have, where they have fallen on low buildings or directly into the earth, penetrated some distance before exploding. An explosion under these circumstances possesses a considerable shock-wave component at the expense of horizontal blast. The demolition effect of shock-wave can be minimised only by the adoption of "earthquake" forms of construction. Briefly: A maximum continuity between structural members combined with a raft foundation system.

Splinters: Resistance to splinter penetration is the least complex effect of explosions. Practical tests by the Home Office before the war, subsequently published, do not appear to have been seriously augmented or disproved during the last few weeks.

Blast: With regard to the question of blast, a number of aspects appear to have been clarified.

(1) The actual lethal effect of blast-pressure as such appears to have been over-estimated.

(2) The importance of "safety-valve" construction has been confirmed beyond all reasonable doubt.

(3) The efficacy of various measures to prevent the blowing-in of glazing is still difficult to assess on any basis which would satisfy an observer accustomed to modern quantitative experiments.

RESTRAINT: "SAFETY-VALVE" CONSTRUCTION.

The second of these observations has a most important bearing upon the design of emergency industrial structures for vulnerable areas.

Few, if any, bombs explode under conditions so similar that they would satisfy—as comparative examples—proper scientific examination. Yet there can be no doubt but that the greater the freedom provided for the blast-pressure to reach equilibrium with the atmosphere, the less damage to structural fabrics is likely to occur. Thus, an enclosed cell consisting of massive panels alternating with light easily blown-out ones will offer a simple path for the blast-pressure without damage to the massive panels. (This, of course, does not account for the effects of shock-wave and splinter penetration.)

The importance of this factor is as follows: Provided as much provision as possible is made for letting out the blast from a direct hit on the building, excessive damage to the frame of a structure—and with heavy industrial works to the actual plant—may be minimised.

Along these lines one might expect the ideal industrial building for vulnerable areas to consist of a complete frame (all parts securely connected together*) with light panel walls designed to blow-out instantly, and made of inexpensive materials which may easily be replaced. There is, however, an unfortunate snag in this line of reasoning. Although this might be the best system to minimise damage from direct internal explosions, no protection from near misses would be provided. Therefore, provision for blast escape must be made, yet at the same time some form of protection against external explosions provided.

After digesting the foregoing considerations, certain general suggestions for emergency factory design may be made—suggestions which might not be found practicable under present economic conditions, yet which, being parallel in effect to questions of deep versus surface shelters, are ones meriting the closest consideration at this stage of the war.

DIAGRAM 1A shows how, where partition walls and external walls of similar strength are used, a direct hit tends to break from one cell to another, and therefore increase—perhaps double—casualties, even with a blow-out roof.

It should be realised that since the external walls are of some mass, and are rigidly secured to the frame, the pressure on a large area of wall surface is likely to be transmitted to the frame and cause its failure.

DIAGRAM 1B shows that by making the party wall stronger than the external walls, the tendency is for the external wall to offer easy passage to the explosion, reducing the possibilities of failure of the partition wall. In this case no provision for protection against near misses is provided by the light external walls.

PRACTICAL SUGGESTIONS FOR SHELTER-FACTORY CONSTRUCTION.

DIAGRAMS 2A and 2B show a typical cross-section through a shelter-factory which, if properly sub-divided, should offer a standard of protection equivalent to that provided by shelters having cells equal in size to the factory sub-division—a structure, moreover, which might be expected to suffer the minimum of damage from a direct hit or near miss (for any building other than a deep shelter or other extensively protected structure).

DIAGRAM 3 shows the general arrangement of internal and external baffles in plan.

To obtain the best value from the adoption of these principles, the general structure should be as follows:—

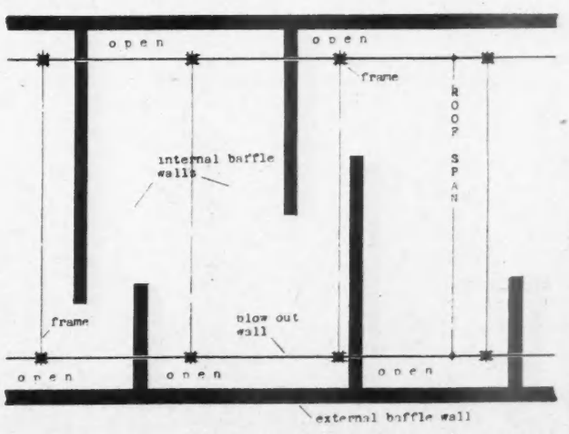


Diagram 3.—Plan of baffle and blow-out wall arrangement for shelter-factory.

* See Ministry of Home Security Bulletin, No. C.8.

FOUNDATIONS.—Raft type, even where a sub-surface structure is concerned. This will minimise the effects of shock-wave transmitted through the ground. The floor should be as strong as possible to encourage the early detonation of bombs scoring a direct hit.

STRUCTURAL SUPPORTS.—Continuous welded or carefully gusseted riveted frame, as much as possible independent of any wall or other panel capable of supporting the roof without aid from walls or partitions.

EXTERNAL WALLS.—Panels of lightest, cheapest, and most easily obtainable material, of a type unlikely to break up into dangerous splinters. Although these walls must be expected to be weatherproof, there is no reason why they should not consist of wood-wool concrete, or fibre board, or similar material.

BAFFLE WALLS.—Should be as massive and strongly constructed as economically possible, not less than 6 ft. high and certainly not less than the standard of blast and splinter resistance set out by the Code.

PARTITION WALLS.—Should be individually framed, and entirely separate from the remainder of the structure.

WINDOWS.—Should be dispensed with wherever possible, and either be of "non-splintering glass" or, better still, of cellulose-acetate sheet or other suitable transparent or translucent colourless resinoid. This could be extremely thin, and need not be excessively costly.

ROOFS.—Should be "splinterproof" (Code), supported by the steel framing, and not connected to wall-panels.

(*To be continued.*)

AIR RAID DAMAGE:

WHAT TO DO ABOUT IT

A BROADCAST TALK.

A TALK on the subject of "Air Raid Damage and What to do About It" was broadcast on Friday last by Mr. MURRAY LESLIE (Associate Editor of *The Builder*). After dealing with some of the problems facing families which find themselves homeless as a result of an air raid, Mr. Leslie said:—

"Now for your house. If you are a leaseholder or rent your rooms, your lease (and with it the liability for repair) becomes void in the event of the accommodation being rendered uninhabitable by the air raid. In other words, if you can't live in your house you cease to pay rent.

"But as there are two sides to every contract, and even the landlord must live, he may exercise his right to hold you to your agreement if the accommodation, or a sufficient part of it, can be satisfactorily repaired. That, as I think you will agree, is only fair.

Repair of the Structure.

"We now come to the repair and the responsibility for repair of the actual structure. You will understand that I speak as an interested party when I tell you that early this week the house next door was blown to—well, at any rate, it was very badly damaged by a bomb, and my home received some damage too.

"You may be sure that my neighbour and I were both very keen to find out what was going to happen and who was going to help. Well, this is what will take place:

"Our local council, like all local authorities in the country, has squads of men and stores of material standing by, ready to carry out temporary repairs to make the houses weather-tight and possible to live in. So the council, after surveying the damage (which they did by 10 o'clock in the morning after the raid) sent down and replaced the broken tiles on the roof, and would have patched up the windows had not every pane of glass in the house by some extraordinary chance escaped injury.

"As for my neighbour's house, there was nothing to be done except to place a large tarpaulin over the broken part to keep wind and rain off the exposed interior.

"What will happen now, put very briefly, is this. My neighbour and I will have a choice of action. Either we can do the repairs ourselves or we can leave matters to the local council. In any case we shall have to submit a claim for compensation within 30 days. If we decide to act for ourselves we shall take the advice of an architect or of a builder about getting matters put to rights. Before this, of course, the district valuer will have estimated the damage for the purpose of compensation.

"The second course open to us is this: If we are unwilling or unable to carry out the work ourselves, the council may—if they so decide—compulsorily carry out the repairs themselves. To do this the council must obtain the consent of the Ministry of Health and must serve us with a notice. During the 14 days before this notice expires we will be able to discuss the schedule of repairs with the council. Then, as the lawyers put it, the cost of repairs is registered as a charge against the property, but will rank for compensatory grant after the war.

"If this makes you think hard for a moment, as it did me, all it means is that the council will do the work, and that you—the owner—must settle up with them after the war, with the aid of the compensation to which you will be entitled.

"Normally, I learnt, the council would not carry out large repairs. They certainly would not do so if it was considered unwise to rebuild at present in the same area, but, on the other hand, they might decide to rebuild if there was a local shortage of housing. The decision rests with the council, and they have to consider the circumstances in each case.

The Question of Compensation.

"So far it has been pretty plain sailing, but here a snag crops up. It arises out of the compensation question, and is particularly connected with the district valuer's method of estimating the value of the damage. He takes building prices as they were in March, 1939, but I have to pay for the actual repairs at current prices—which at present are a good deal higher.

"Do you get it? It means that if I decide to go on with repairs off my own bat, it may cost, say, nearly £100—of which perhaps only £50 may rank for compensation. If the council does the work there is the same difficulty; the cost of the work they do is charged to my property, but I may only get compensation at the valuer's March, 1939, estimate.

"That is the law as it stands; but there are gleams of hope, you will be glad to hear, for I am told that this estimate may not be a final one; prices fluctuate, as you know, and the March, 1939, prices were taken as a standard. To put matters in a nutshell, it seems that I cannot get less than the official estimate of damage, but can very conceivably get more—especially as the Government has said that its ideal is to grant compensation for war damage up to 100 per cent.

A Compulsory Insurance Proposal.

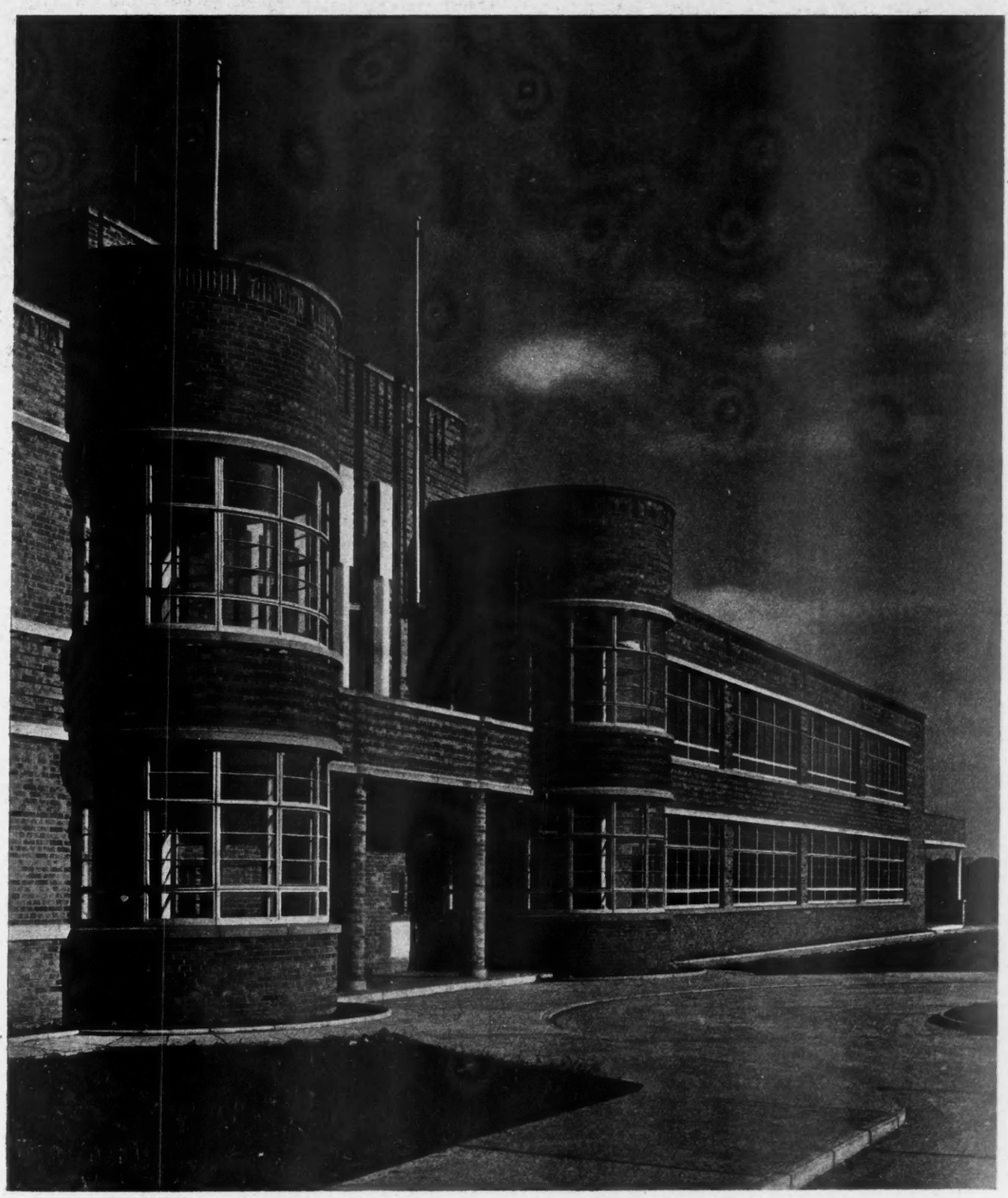
"One factor may alter the situation very considerably. This is a scheme which the Prime Minister announced a fortnight ago for compulsory insurance of buildings against war risks. So far this plan is only under consideration, but no doubt its aim would be to pay compensation in full for damaged buildings. The possibility of including in the scheme buildings already damaged is also sure to receive attention.

"Many owner-occupiers who are buying their homes through building societies must be asking themselves the question: How do I stand in regard to repayments if my house is rendered uninhabitable? Well, I am no lawyer, but the legal position is this—that you are still liable for your agreed repayments of interest and capital. But no society would wish to drive a hard bargain at this time, and special consideration will be given—so I understand—in all cases. One such form of relief might be that you would be asked to pay only the interest due.

"Just one thing more. Remember that in case of distress your Fairy Godmother is your local council. They have been given powers by the Government—and will be given more—to look after you, and they have instructions to use these powers fully and sympathetically. Up and down the country, with very few exceptions, the local authorities are doing great work—often in the face of difficulties.

"And so, as you sit safely in your basement or your Anderson shelter, there is comfort for you in the thought that if your home and belongings are damaged by a bomb, arrangements — and generous arrangements—have been made to soften the blow.

"Don't be unreasonable and expect house and contents to be back in place within a week; that is not possible—however nice it would be. Remember, too, that so far as compensation goes, the Government's aim is to give the fairest deal all round that circumstances will permit."



DETAIL OF ENTRANCE.

KINGSTON HIGH SCHOOL, FOR THE CITY OF HULL

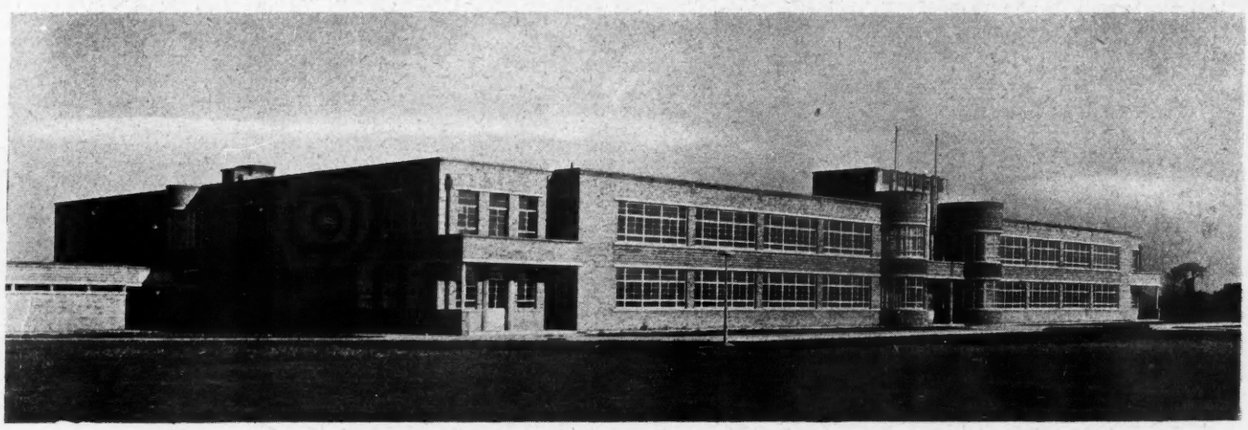
MR. ANDREW RANKINE, A.R.I.B.A., CITY ARCHITECT.

THIS school, intended to replace the obsolete Boulevard Secondary School, is arranged to accommodate 640 pupils, boys and girls. A symmetrical plan form was adopted as being the most satisfactory solution for a mixed school of this type, the assembly hall being placed on the central axis. The site is level.

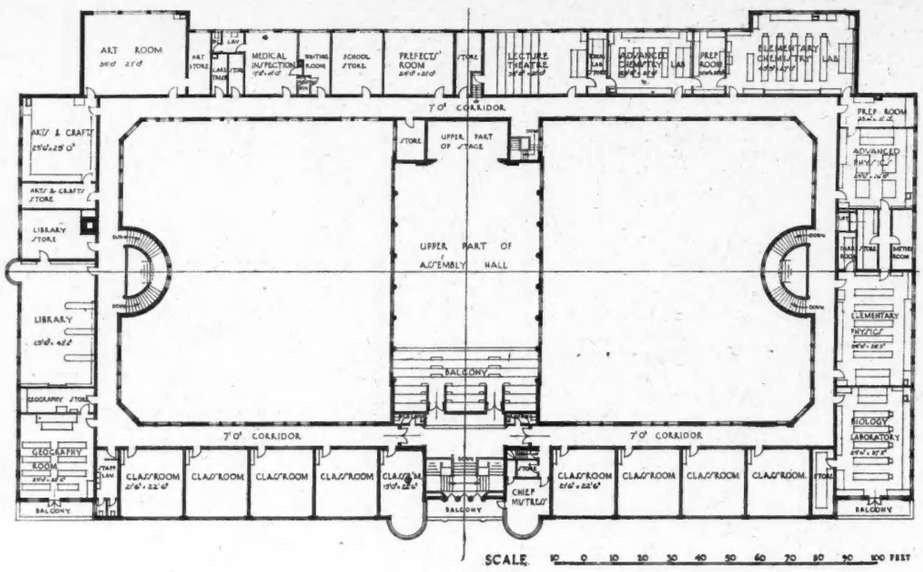
PLAN.—The plan being of compact shape, efficient access is given to all parts of the building. The main circulation of traffic is by means of a corridor running around the whole school. The classrooms are planned on the south side, and the workrooms, such as metalwork and woodwork rooms, on the north side, as is also the art room. The kitchen, dining and homecraft rooms are placed on the north-east corner of the building. The gymnasium is placed centrally on the north side. The latrines are planned separately, being connected to the main school building by means of covered ways. The children's entrances are placed beneath these covered ways with the secondary staircases adjoining.

CONSTRUCTION.—The building is partly steel-framed. The external walls and many of the internal walls are of brick. The roofs and floors are, for the most part, constructed of pre-cast beams. Partition walls are of foamed-slag blocks of local manufacture.

The building is faced with local multi-coloured rustic bricks. The window sills and heads are of cast stone; french windows and special

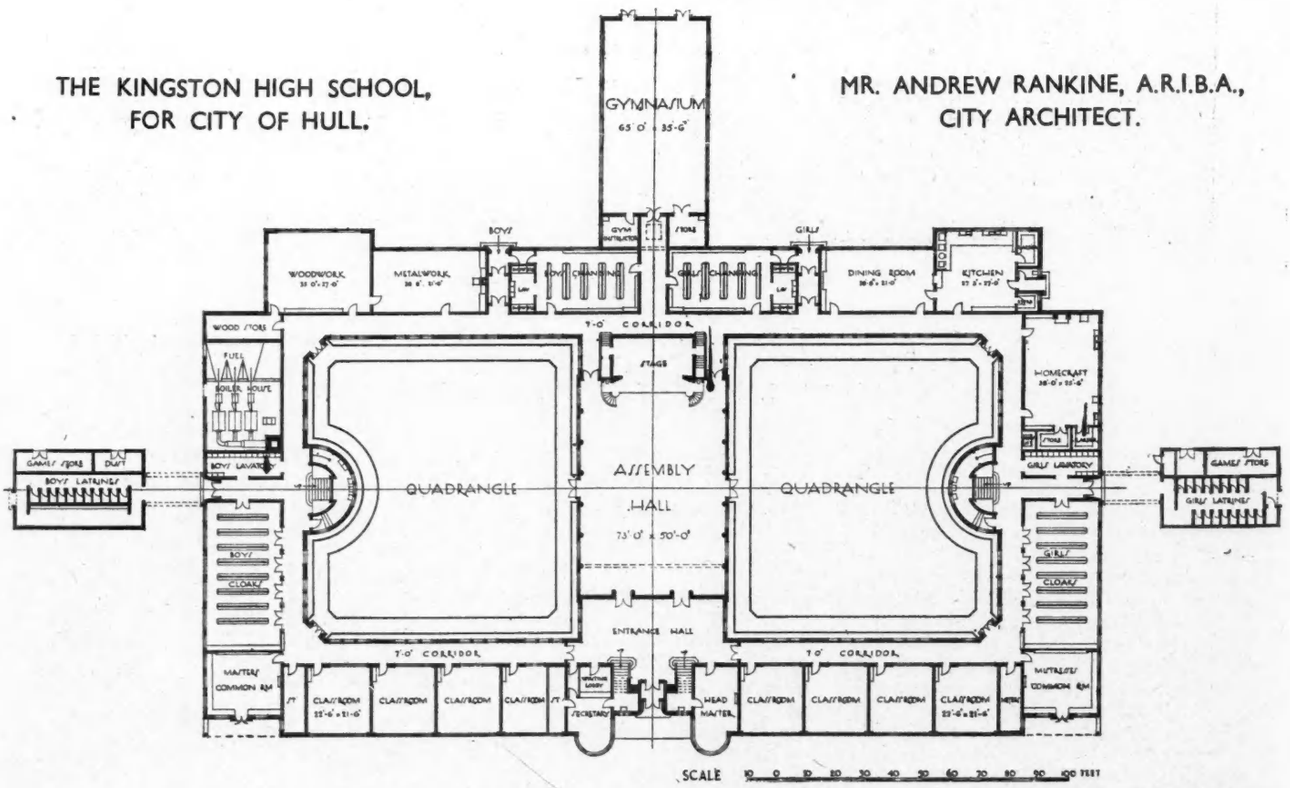


GENERAL VIEW OF ENTRANCE FRONT. *Below*: PLANS.



THE KINGSTON HIGH SCHOOL, FOR CITY OF HULL.

MR. ANDREW RANKINE, A.R.I.B.A., CITY ARCHITECT.



ASSEMBLY HALL, LOOKING TOWARDS STAGE. *Below*: ENTRANCE HALL.

metal casements in sub-frames have been used. The balustrades are constructed of reinforced concrete with brick facing. Over the main entrance are four Portland stone columns, the heads of which have been left to receive carving.

The walls of the main entrance are faced with a grey-green faience with a black skirting of the same material. The floor covering and the covering to the main staircase is of rubber in a warm brown colour. Plastic paint has been used on the ceiling. The assembly hall ceiling and walls are finished with plastic paint. The dado is of oak "Flexwood," and the flooring is strip maple. The classrooms have plaster ceilings and walls, with dados of coloured cement spray material. The floors are of beech blocks.

EQUIPMENT.—There is a small goods lift to serve the laboratories on the first floor. The heating is by low-pressure hot water, fed from boilers with automatic stokers. The hot water is supplied from local electric heaters for both domestic purposes and showers. There is an internal telephone system connecting the headmaster's room with the secretary's office and the staff common rooms. The main pipe runs for heating, gas, water, etc., are provided in a duct beneath the ground-floor corridor. Access to these pipes (which are painted various colours as a means of identification) is through manholes in the floor. There is a sub-floor beneath the laboratories in which run the service and waste pipes.

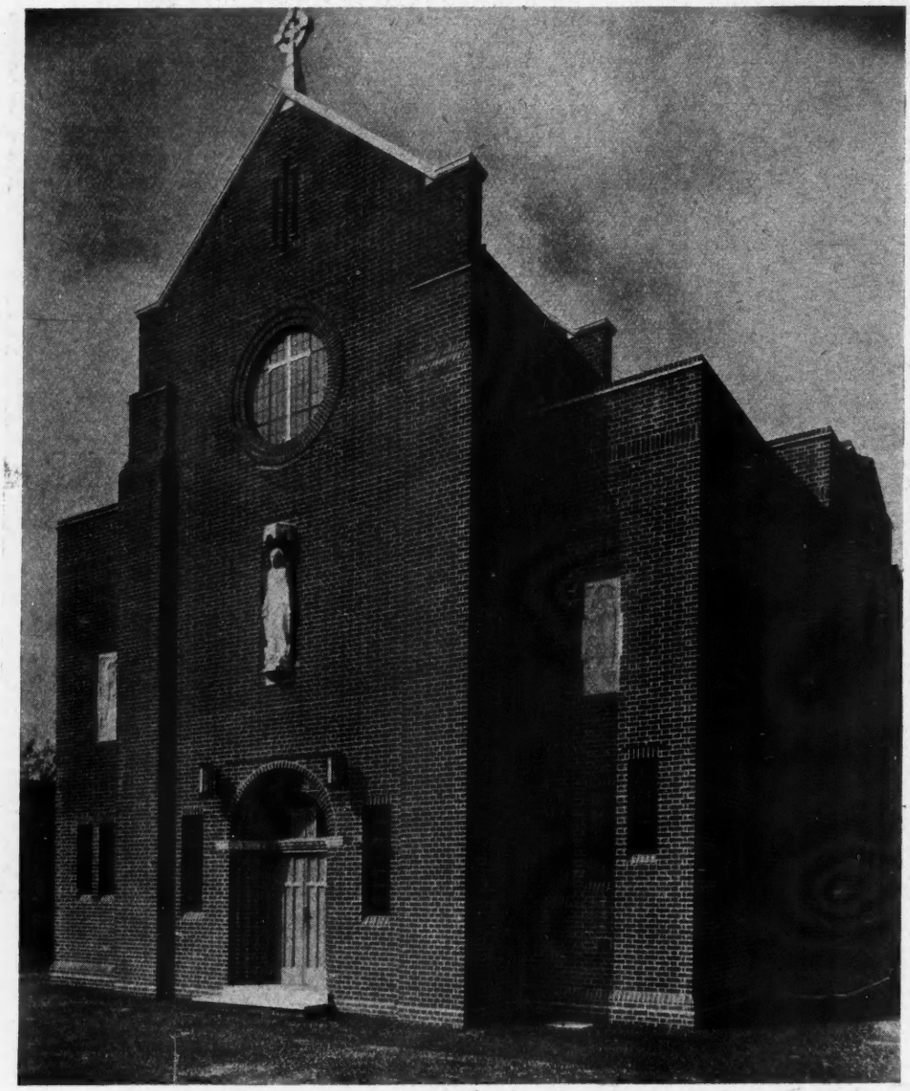
The contract price was £69,745, which worked out at 1s. 4¾d. approx. per foot cube.

The consulting engineer for reinforced concrete foundations was Mr. Gilbert Ness, of Harrogate. The builders were Tarran Industries, Ltd., of Hull and London. Sub-contractors and suppliers are given on page 319.

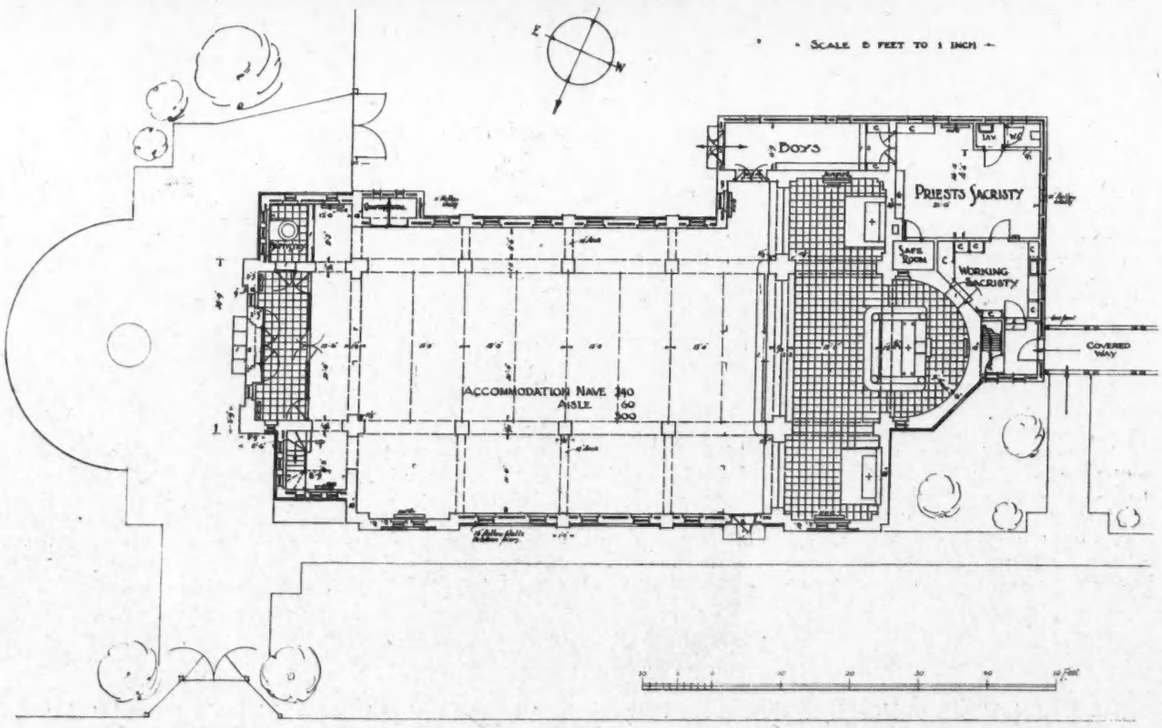
KINGSTON HIGH SCHOOL, FOR CITY OF HULL. MR. ANDREW RANKINE, A.R.I.B.A., CITY ARCHITECT.

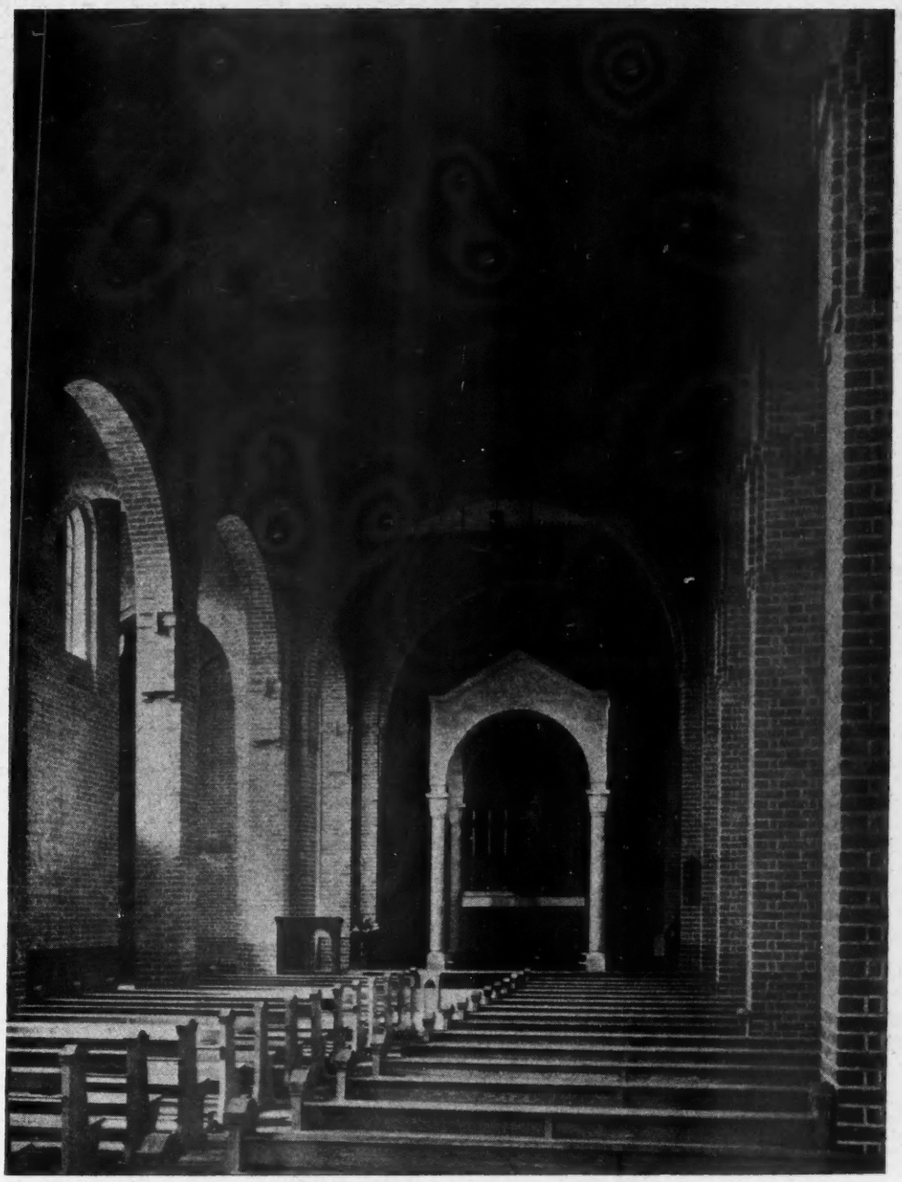
CHURCH OF OUR LADY OF PEACE, SOUTHBOURNE, HANTS.

MR. THOMAS H. B. SCOTT, F.R.I.B.A., ARCHITECT.



Left : ENTRANCE FRONT.
Below : PLAN.





NAVE, LOOKING TOWARDS SANCTUARY

THIS building, complete with altar and furniture, has cost under £10,000. A brick church, it depends in great measure for its attractiveness upon the texture and colour of the bricks. The style is modern Romanesque, the outer bricks being a multi-coloured red. Inside there is a dado of brown Berkshire bricks, the rest of the interior being carried out in bricks whose colour may perhaps be described as "variegated cream mica."

Over the main door is a Portland stone statue of our Lady of Peace, by Mr. Lindsey Clarke, A.R.B.S., flanked by stone panels showing the Annunciation and the Lourdes grotto. Inside the doors is a spacious narthex, separated from the church by a glazed wood screen, pierced by three doors. From the narthex a door opens into the baptistery, from which the newly baptised step up, or are carried up, into the church through wrought iron gates.

The main part of the church is made up of a lofty nave, with an open timbered roof, and two aisles of unequal size, with a chapel at the head of each. The sanctuary, floored with green terrazzo tiles, is separated from the nave by oak altar rails, above which hangs a carved wooden rood. The high altar of Seaton stone is covered by a pillared canopy of Weldon stone. There is a choir gallery over the narthex, with a specially prepared ceiling to act as a sounding board for the Hammond organ.

The builders were Messrs. A. F. Clarke & Sons, Southbourne. The altar canopy was by Marchetti, Ltd., Portsmouth; and the pulpit and altar rails by A. Rowan, Southbourne. Sub-contractors were: heating, G. N. Haden & Co.; reinforcement, B.R.C.; beams, Siegwart; external multi-brickwork, H. C. Parkes & Co.; internal (Dutch), J. P. Walsh & Sons; steps and stonework, Patent Victoria Stone Co.; floor tiling, Martin Van Straaten & Co.; wood-block floor, Bennetts Tungit Flooring Co.; electric work, Bournemouth Electric Supply Co.; asphalt, Ragusa Asphalte Paving Co.

CHURCH OF OUR LADY OF PEACE, SOUTHBOURNE. MR. THOMAS H. B. SCOTT, F.R.I.B.A., ARCHITECT.

EVACUATION: THE "UNDER FIVES"

A.A.S.T.A. REPORT.

WE gave last week a summary of the recommendations of the above report, just issued by the A.A.S.T.A. Some comment upon it is given in our leading article this week. We extract the following technical details relating to materials and construction.

Materials Available.

The fundamental question for the preparation of a war-time building programme is: What materials are available? It must be realised that building for evacuees will have no priority either of materials or of labour; any difficulties there are regarding shortage of materials will apply most acutely for our programme.

Exact information on the supply of materials is difficult to get, especially concerning the stocks of materials held by the Government and large manufacturers. But from a long-term point of view and for buildings without priority a study of the sources of raw materials gives a fairly reliable guide.

(*a*) *Important Building Materials which are completely unavailable for our Programme:*

Aluminium, chromium, copper, asphalt, cork, rubber, turpentine and linseed oil. (This list is subject only to present stocks not being exhausted, or to special "financial influence" in the Government promoting unexpectedly large importation.)

(*b*) *Materials, new supplies of which are limited, or the use of which is strictly regulated by a priority system:*

Iron and steel, lead, tin, zinc, jute, cotton, flax, asbestos (pressure pipes) and timber.

(*c*) *Materials available in quantities adequate for our Building Programme:*

Cement, concrete, asbestos cement, bricks and all burnt clay products, slates and natural building stone, gypsum and lime plasters, glass, bitumen and coal by-products, fairly adequate supplies of paints, an important range of natural plant fibres.

At the present time a part even of this third list of materials is not immediately available for an evacuation building programme, yet we consider that these difficulties are temporary.

Further comment is needed only about the group of fibres, since the other materials are quite familiar to the building trade. We suggest using these fibres as reinforcement to gypsum plaster. Timber and jute fibres have been used for centuries in this way, but the shortage of standard timber and the fact that all our jute comes from India may make the use of other and less familiar fibres necessary. Tremendous amounts of sticks, twigs and small timber from the English hedgerows are both available and satisfactory for this purpose, and fibres of many common plants, such as straw, reeds, stinging nettles or heather can be used as alternatives.

Thus, apart from the fibres, which are not normally suitable as reinforcement for concrete, the structural materials available to us are of the heavy, non-tensile type used in traditional building. Our programme must be put into practice immediately, so that we are not suggesting the use of materials which are not yet in production. We are relying only on simple and economical applications of well-known materials which will get the job done.

Methods of Construction.

(*a*) *Standardisation.*—Both for economy, ease of organisation and speed of erection, a considerable degree of standardisation is necessary in a national building programme. We consider that the basis of standardisation must be *a structural unit* and not a whole building type, or even a number of planning room units. This opinion is based on two main considerations:—

(1) The materials we are using will only permit a partial system of pre-fabrication;

(2) The variation in planning, accommodation and expression between buildings in different localities must be considerable if the best solution is to be achieved in each case.

We therefore recommend that a "Structural Plan Unit," which is a common factor of the planning requirements and the structural method used, should be adopted for

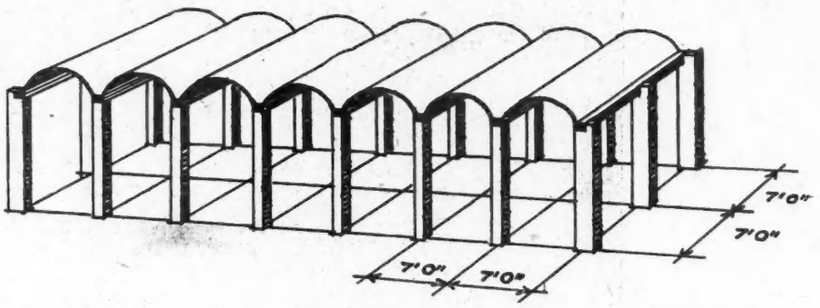


Fig. I.—Prefabricated plaster arch and beam construction. Diagrammatic sketch.

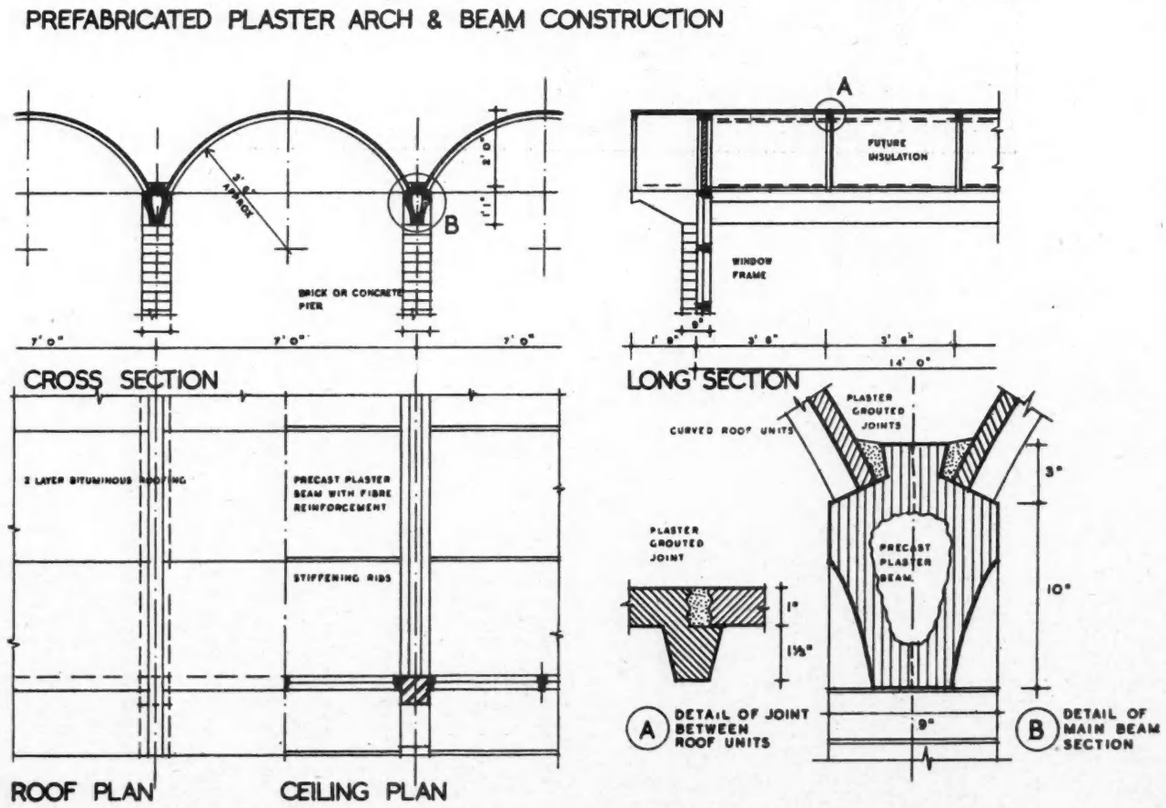
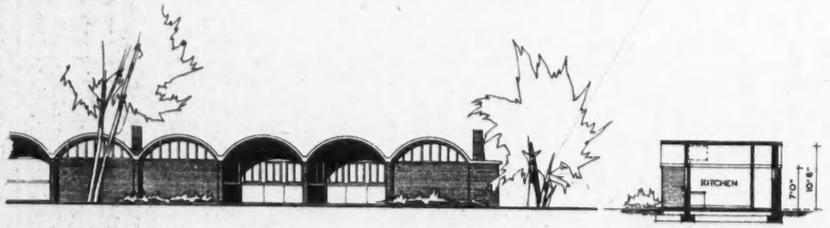


Fig. 2.—Prefabricated plaster arch and beam construction.

1 FAMILY COTTAGES DESIGNED BY JUSTIN BLANCO WHITE & BIRKIN HAWARD A/A.R.I.B.A

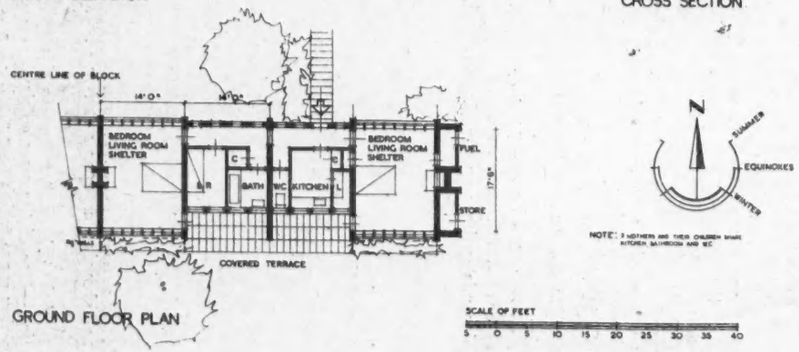
2 MOTHERS & CHILDREN

VIEW FROM SOUTH



SOUTH ELEVATION

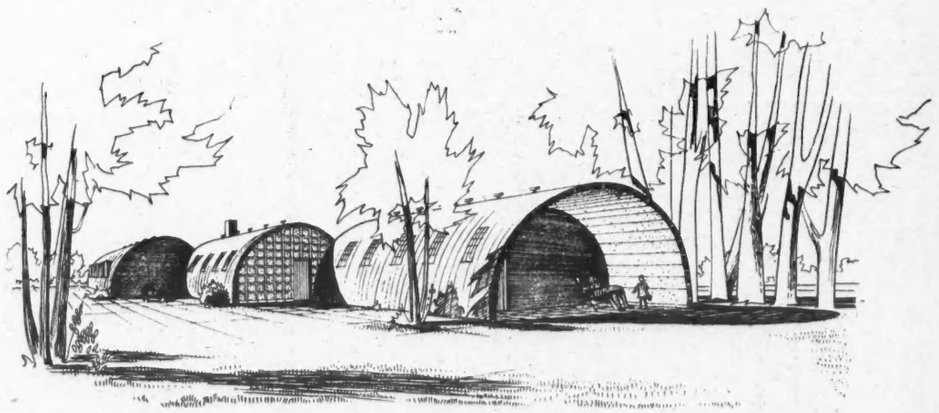
CROSS SECTION



GROUND FLOOR PLAN

2 MOTHERS AND BABIES HOSTEL DESIGNED BY ERNO GOLDFINGER D.P.L.G. MARY CROWLEY A.R.I.B.A

12 MOTHERS & CHILDREN

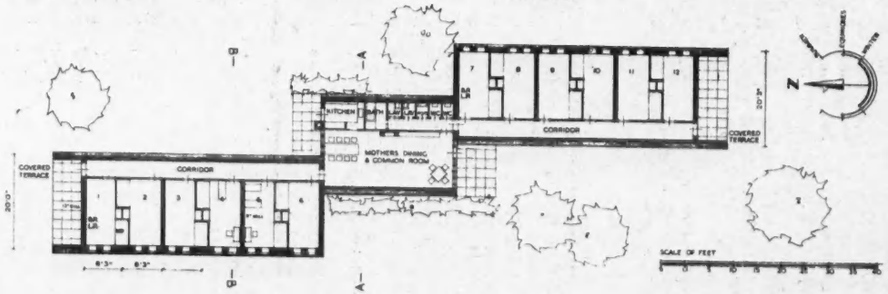


VIEW FROM SOUTH

SOUTH ELEVATION

SECTION AA

SECTION BB



GROUND FLOOR PLAN

DESIGNS FOR (1) FAMILY COTTAGES, AND (2) MOTHERS AND BABIES' HOSTEL.

(From the A.A.S.T.A. Report on "Evacuation : The 'Under-Fives.'" See page 312.)

each building type. This principle is illustrated in our designs.

The planning requirements and structural methods limit our buildings to one storey.

(*b*) *Methods.*—We do not propose to set out here all the points which we have considered in comparing structural methods. We describe here only those methods which seem to us, for an accumulation of reasons, to be the most suitable. The main considerations have been : Materials available, shortage of skilled site labour, standard of protection against air attack, speed of building, economy in transport, general economy.

(*c*) *Floors and Walls.*—The construction of floors and walls does not present much difficulty. The normal materials, such as bricks and burnt-clay blocks, concrete (*in situ* or precast block form), natural stones, asbestos cement sheets, partition blocks and plaster units, are all available. The question of transport may well be a deciding factor between these. Local materials should be used for preference.

(*d*) *The Roof.*—The chief structural problem under war conditions is to span the roof. There are, of course, normally innumerable ways of doing this, but the exclusion of the normal tensile materials greatly limits the field. Since the restricted supply of steel, timber and other tensile materials applies to the whole of war building, any substitute material, such as asbestos pressure pipes, will cease to be available for our purpose as soon as its value is realised. If production of such materials can be sufficiently expanded, it will be an easy matter to use them in place of arch construction.

In order to avoid the use of tensile materials we have adopted an arch construction over restricted spans. We put forward two main methods :—

Type 1.—*Self-centering Block Arch.*—A simple and traditional means of using an arch construction without great resulting thrusts is by the arrangement of arches in series. In this method the arches span between continuous solid cross walls along the springing of each pair of arches. The planning restrictions of such a system are clearly considerable, so that its range of use is limited mainly to domestic types. An example is design No. 1 for the family cottage unit. Alternatively, cross walls can be cut out at a sacrifice of normal window arrangement if a barrel vault runs continuously along the length of the building. An example is design No. 2 for a mothers' and babies' hostel. The vault in these designs is formed of precast standard concrete or plaster units. These must have a special shape, such that when one complete arch line has been placed, supported, say, on an end wall, the successive arches can be placed in position by building up on the projection forward of the previously placed arch.

In this way, *no centering of any kind or reinforcement of steel or timber is needed.*

The method depends entirely on the shape and accuracy of the precast blocks, and we believe it would be workable for spans up to 20 ft. maximum. The design for "a block arch hut" recently developed by the Building Research Station* is an illustration of this method. Our designs for the mothers' hostel, the family cottages and the dormitory of the nursery school show the possible applications of this excellent construction. We have also ourselves worked out a method of achieving a similar result.

If these types of construction are executed in concrete blocks, some protection is given against blast and splinters. The constructions shown for the mothers' hostel and the dormitory of the nursery school provide better A.R.P. than that shown for the family cottages, since in the latter, if a bomb breaks one arch, the neighbouring ones may fall in towards it.

Type 2.—*Pre-fabricated Plaster Arch and Beam Construction.*—One of the most efficient methods of covering space which uses a minimum of tensile material is a combination of arch and beam. This may be represented as a part of a cylinder, supported at four points only, which spans as an arch in one direction and as an arch and beam in the other.

If a number of these are placed in series the arch thrusts will be countered and the only tensile stresses will occur along the valleys between arches. The structure thus becomes as in Fig. 1 (p. 312).

Clearly this method has great advantages over Type 1 in allowing freedom of planning. For convenience of building we propose to form the arches of pre-fabricated curved units 1 ft. 9 in. or 3 ft. 6 in. wide over a 7-ft. span, resting on precast beams 14 ft. long, and so forming a structural bay 14 ft. by 7 ft. (See Fig. 2, p. 312.)

The curved units are of gypsum plaster 1 in. thick with a small stiffening rib, and they and the beams are lightly reinforced with wood splines or other fibres. The beams are hollow, cast in two parts, and grouted together on the site. The extreme thinness and lightness of the roof units is characteristic of plaster. We found that a heavy man could walk and move about on the top of the experimental bay which we had constructed.* In this bay the curved units and precast beams were simply grouted together on the site. The beams could have been made with an indented edge so that the curved units could be grouted into them more thoroughly, making a closer approximation to a monolithic structure. In our sample bay this was not done.

There are possibilities of waterproofing the units of this system by dipping in resin or painting so that a separate weatherproof covering would be unnecessary. The units have great fire resistance, and by their form can be stacked closely so that transport is easy. At a later stage the standard of heat insulation can be improved by ceiling the rooms with fibre boards, etc., which can be nailed direct to the plaster.

All units in this structural system are light, easy to handle, quickly made from plaster formwork, quickly built, strong and cheap. The type of labour required, partially skilled but mainly unskilled plasterers, is at present available.

(*e*) *Windows.*—Despite present stocks of standard metal windows, for a programme such as ours alternatives to metal or wood windows would be necessary. The problem of window design is simple for fixed lights. The window type must, of course, be related to the type of walling and structural method. We suggest that the most suitable materials for window frames are precast concrete moulded plaster or slate. These frames will be standardised to suitable overall sizes, and will be sufficiently strengthened by subdivisions to permit pre-fabrication and easy transport to the site. Fixed glazing will be puttied in on the site. Glass bricks should be used for fixed lights in bedrooms. As much of the window space as possible should be of this kind, separate louvred ventilators being provided where necessary.

Opening window lights can be formed of unframed toughened glass sheets sliding on fibre runners set into the frame. A further method of arranging opening lights with a minimum of metal or wood is by vertical or horizontal pivoted units, each fitting directly into the fixed frames.

(*f*) *Doors.*—A satisfactory door of peacetime standards has not yet been constructed without the use of timber or steel, but for our building programme some temporary expedients are possible. For some positions a curtain alone would do. In other positions glazed doors with a hardwood frame could be used, or else doors of fully compressed asbestos cement sheeting with or without a backing of insulation board.

Economy in Finish and Equipment.

The production of the building shell is our first consideration, since it provides shelter for the children. We have discussed above ways of providing floors, walls, roof, windows and doors. In view of the urgency of the situation a great amount of work on internal finishing and equipment could be left over for a more suitable time. The main savings in this way are as follows :—

(*a*) Omission of internal wall plastering.
(*b*) Reduction of painted areas.
(*c*) Temporary floor finishes (such as grano to take lino later).
(*d*) Coal fires in main rooms pending central heating installation.

And until the third building stage :—

(*e*) Oil lamps in place of electric light.
(*f*) The use of pots for all children instead of proper w.c. equipment.
(*g*) The use of bowls and portable baths for washing instead of glazed earthenware lavatory basins and normal baths.
(*h*) Saving on plumbing and water supply due to (*f*) and (*g*).

* Described in the Building Research Station War-time Bulletin No. 6, H.M. Stationery Office.

† An experimental bay was constructed for us by Messrs. Gilbert Seale on April 9, 1940, at their workshops, 22, Lomond-grove, Camberwell, S.E.5.

EMERGENCY INQUIRY BUREAU

Questions from readers arising out of War-time difficulties and recent Emergency legislation will be answered by a special staff of contributors. Questions, which should be addressed to the Editor, should be accompanied by a stamped addressed envelope.

Air Raid Damage: £5 Limit.

SIR,—*I am told that under the Housing (Emergency Powers) Act, 1939, it is not possible to secure compensation for damage done to houses which is estimated at less than £5. Is this so?* WATFORD.

A correspondent writes : The position is that the replacement of individual items of damage (*i.e.*, displaced tiles, broken windows, etc.) whose replacement as the result of any one raid would cost less than £5 will not generally be done by the local authority but will be the responsibility of the person in control, *i.e.*, the person receiving the rack-rent. But as regards compensation, a statutory notice concerning the damage should be sent in to the local authority in the ordinary way. Should subsequent damage occur, and the total damage at the end of war exceed £5, then the claims will rank for compensation.

War Damage and Building Society Repayments.

SIR,—*What is the position of a mortgagee who is acquiring a house through a building society in the event of the house being rendered uninhabitable by enemy bombing. Is he still liable for his agreed repayments?* ESTATES.

A correspondent writes : Yes; his agreement stands. But building societies are always willing to grant relief in hard cases, which relief might take the form of suspending the repayment of the capital outstanding, merely asking for interest. Individual cases will, in fact, be treated on their merits.

R.I.B.A.

Examinations, May and July, 1940.

The questions set at the Intermediate, Final and Special Final Examinations held in May and July, 1940, have been published, and are on sale at the Royal Institute, price 1s. 3d. inclusive of postage.

The late Mr. R. E. Narracott.

The death has taken place at Torquay of Mr. Robert Edward Narracott, in his 67th year. Until his retirement a few years ago Mr. Narracott was principal of the firm of Messrs. R. E. Narracott and Sons, building contractors, now carried on by his sons. The firm has executed many important buildings in South Devon. Mr. Narracott joined the Town Council in November, 1938, and was also an active member and a former President of Torquay Federation of Building Trades Employers.

THE PROTECTION OF PLATE-GLASS WINDOWS

HOME SECURITY BULLETIN NO. C.9.

THIS Bulletin (issued by the Ministry of Home Security, Research and Experiments Department) is concerned with vertical windows, fixed or made to open, fitted with plate-glass $\frac{3}{16}$ in. thick or more. Such windows are common in shop-fronts, restaurants and hotels, in internal display cabinets inside or outside buildings. The protection of the interior, lit by the window, is also considered.

General Notes.

Shop windows are prone to damage by blast because of their areas. Small panes of plate glass are relatively strong but may fail by the frame breaking. The weakest form of fixing for plate glass is to fasten the edges of panes by means of clips and bolts through the glass. Stout steel or bronze frames are generally better than wooden ones, though much depends on the dimensions of frame sections in relation to pane size.

When a bomb explodes the direct blast pressure may force in the window, or the suction following the pressure pulse may pull it outwards. At greater distances reflections of the shock-wave may start strong vibrations in a window which happens to have the same natural frequency. Such a window may break when others close by are unharmed.

The minimum distance from an explosion at which plate plass will escape damage cannot be predicted, but within 200 ft. its chance of survival is small. Beyond that distance the chance depends on factors which include size and thickness of pane, frame fixing, size of bomb and method of detonation and, in particular, the reflection of the blast-wave from adjacent buildings. The last factor is chiefly responsible for the apparently freakish fracture of windows. Panes facing the ends of streets leading towards the explosion often break where adjacent windows escape. Where blast travels along a street, the side panes (at shop entrances, etc.) may be broken and the larger front panes escape; elsewhere the reverse may happen.

When a pane breaks under severe blast, pieces may be scattered violently. It is not possible to foretell whether the pieces will fly inwards or outwards. When a pane breaks under distant blast, pieces generally fall inside and outside within a few feet.

Plate glass in internal partitions, show-cases, etc., is almost as liable to fracture and to dangerous scattering as glass in external windows. Plate glass in doors, and in sliding or hinged windows, is somewhat less vulnerable than in fixed windows, provided the door or window allows some degree of movement. The decrease in risk does not warrant the omission of protective measures. It is desirable to fasten doors wide open during air raids and generally to open windows.

Resisting Fracture.

There is no method of preventing the fracture of glass under blast except by complete closing of the window opening as described in A.R.P. Memorandum No. 12, "Protection of Windows in Commercial and Industrial Buildings"; nor has any method yet been discovered of materially increasing the resistance of glass to blast while retaining its transparency.

BRACING DEVICES.—Various forms of bracing and damping devices have been investigated, but none has been found which can be relied on to strengthen the resistance of the glass. In certain circumstances a bracing device may increase the liability of the pane to fracture. The behaviour of braced windows in air raids has confirmed the investigations. An important objection to such devices is that it may give the building occupier a false sense of security, blinding him to the need for providing against the danger of flying glass. This danger is in no way eliminated by any bracing device.

The possibility of increasing the resistance of large sheets of plate glass is being investigated. Research, however, does not at present indicate more than that it is useful to provide a flexible setting for the glass.

Minimising the Results of Fracture.

Since it is not practicable to prevent the fracture of plate-glass windows, while retaining their transparency, efforts should be directed towards minimising the results of breakage. Such results include injury from flying glass, damage to stock or other contents of the building from flying glass and from exposure to weather, and, in shops, pilfering of stock and loss of trade.

The following methods are available :—

(1) BOARDING UP EXTERNAL DISPLAY WINDOWS.—Windows may be covered externally with boarding on stout framing, securely fixed, and provided with hinged shutters over openings exhibiting the display space. (See A.R.P. Memorandum No. 12, pp. 18, 32 and 33.) Such boarding only gives a slight degree of protection. Under severe blast the boarding may be dislodged bodily, but is likely to be replaceable with minor repairs. Shortage of timber discounts this method.

The advantage of boarding over the methods described later is that it gives some protection against weather and pilfering to the display space and to the stock. Since boarding gives little protection against the scattering of glass fragments internally, it is desirable to add such protection as described below (paragraphs (4), (5) and (6)).

Rolling shutters of steel or wood give less protection than boarding. Under severe blast they may be dislodged from their guides. Open-mesh shutters of "portcullis" type often escape damage by blast, but protect only against pilfering. The obsolescent sectional wooden sliding shutter gives protection similar to light boarding.

(2) BRICKING UP THE DISPLAY SPACE.—Internal damage can be much reduced if a solid brick wall is built at the back of the display space. If this wall, which should extend to the ceiling, is 12½ in. thick, the shop interior will be given lateral protection on the street side like that afforded by an air-raid shelter. Even with a 9-in. wall, protection is appreciable. It is desirable that entrance to the display space should be at the side and not through the protecting wall. This method has the serious disadvantage that it is a major structural work and may necessitate a special support for the wall. A brick wall gives the maximum obtainable protection to shop interiors.

(3) IMPROVING PANELLING BEHIND DISPLAY SPACES.—Where display spaces in shop fronts are backed by wooden panelling, if this is substantial, well braced, and extends to the top level of the glass, it provides useful protection to the interior. Where panelling is low, wire netting of ½-in. mesh should be securely fixed between the panelling and the ceiling.

(4) WIRE NETTING.—Wire netting of ½-in. mesh will stop all but the smallest fragments of broken glass; these, except under very severe blast, are not likely to fly far. There is no need to use two layers of netting. Expanded metal of similar sized mesh gives equal protection but less transparency. The netting must be securely fixed, that is, by firm stapling or strongly nailed battens. In order to allow cleaning of the glass, the netting is best attached to removable wooden frames. These should not be flimsy. The frames should be securely fixed to the structure, *e.g.*, by bolts rather than by turn-buttons. It has been found in practice that the fixing and framing are the weakest parts of protective netting systems. The netting should be as close to the glass as possible, preferably touching it. Netting of larger mesh than ½ in. has much less effect in arresting flying glass fragments. A mesh larger than 1 in. may pass dangerous fragments of glass.

Some local authorities have asked shop-owners to fix wire mesh outside plate-glass windows lest glass lying in streets should immobilise Civil Defence vehicles, such as fire engines and ambulances, by damaging the rubber tyres. Research and practical experience show that this risk has been exaggerated.

(5) BLINDS AND CURTAINS.—Blinds and curtains, particularly if heavy and thick, give a moderate degree of protection against flying glass fragments, except under intense blast.

(6) ADHESIVE TREATMENTS.—An adhesive treatment does not make the breakage of glass less likely, but, if appropriate to the weight and size of glass, it affords a useful measure of protection against the scattering of fragments. The following "anti-scatter" adhesive treatment is suitable for plate glass $\frac{3}{16}$ in. or ¼ in. thick, though it reduces the transparency. A full coat of varnish is brushed on the glass and when it has become tacky a sheet of fabric or strong textile netting is pressed into the varnish so that the whole glass area is covered. When the material is thoroughly set a full coat of varnish is brushed over the whole.

Where considerable transparency is required (*e.g.*, in display windows), textile strips can be used, though this treatment is not so efficient as a close mesh netting all over the glass. Interspaces between strips should not be more than 6 in. each way. The stronger the textile and adhesive, the better the result. Transparent film of "Cellophane" type pressed into and afterwards coated with varnish is a useful alternative to the fabric or textile netting treatment. The above adhesive treatments cannot be used on obscured glass, unless the surface is smooth enough for the material to adhere firmly. Where adhesion is likely to be poor, internal wire-mesh screens should be used, or the glass removed.

Liquid coatings and paper strip are not recommended for plate glass.

Removal of Glass and Repairs.

The safest plan is to remove plate glass, if necessary, substituting translucent or opaque materials. Much glass in interior partitions, show-cases, fanlights over doors, etc., can be dispensed with, at least in war time. The use of substitutes for glass should be considered in undertaking repairs. Materials having a transparency approaching that of glass are difficult to obtain owing to the demands of aircraft production. Moreover, they are not made in sizes suitable for average shop-window openings, unless the latter are subdivided. Where, in undertaking repairs, it is desired to retain the use of the display space, a reduction in size of pane should be considered. If the opening is bricked up, or otherwise closed, leaving a glazed aperture about 4 ft. by 2 ft., this will usually allow inspection of the display space from the street, or will at least indicate that the shop is open. The aperture may be glazed with a transparent glass substitute (if obtainable), or by plate glass, protected inside with wire mesh.

Information on glass substitutes is available in Bulletin C.10 (which follows on page 316).

Trade with Canada.

H.M. Senior Trade Commissioner in Canada has revised his "Memorandum on Trade with Canada"; it is not published, but copies will soon be available (free of charge) on application to the Department of Overseas Trade, Great George-street, London, S.W.1. The Memorandum is a booklet of 48 pages dealing with all requisite information. The Department can also furnish selected lists of importers and department stores, classified according to the goods handled, and of leading manufacturers in the Dominion (as buyers of raw materials and semi-processed goods), rates of import duties and statistics of imports. The Department is also pleased to receive inquiries from United Kingdom firms desirous of appointing agents, a course that is practically essential in this extremely competitive market. (Reference No. 20976/40 should be quoted.)

FLEXIBLE SUBSTITUTES FOR GLASS

HOME SECURITY BULLETIN NO. C.10.

THE Ministry of Home Security (Research and Experiments Department) has issued Bulletin No. C.10, on "Flexible Substitutes for Glass." Glass damage from a bomb explosion, it states, is always much more widespread than its other effects. The breaking of glass and the violent scattering of its fragments under the blast of high-explosive bombs cause a fair proportion of air-raid casualties, and serious inconvenience from exposure to weather. Several "anti-scatter" treatments to prevent the flying of glass fragments have been recommended in Ministry of Home Security publications,* but though such treatments may hold fractured panes together, they neither reduce the risk of breakage nor prevent the pane being wholly dislodged if the blast is violent enough. Extensive air raids are likely to cause, through destruction of glass alone, delays in production, discomfort, and casualties.

It appears unwise to replace broken glass with new glass, in view of the risk of repeated attack and because new glass would in turn require protective treatment. Further, supplies of materials for protective treatment can be expected to serve only a fraction of the glass at present in use. The utility of a flexible substitute for glass that can be harmlessly dislodged by blast and readily replaced is therefore obvious.

The Ministry of Home Security has arranged for an investigation into materials suggested as glass substitutes in general. This Memorandum gives available information which it is hoped will be considerably amplified in the near future.

Materials.

Flexible substitutes may be either translucent, or, where permanent obscuration is required, opaque. Most translucent substitutes are at present made of synthetic resins or cellulose substances reinforced with metal or textile mesh.

Alternatively, cotton or linen textiles may be used; these are not ordinarily windproof or rainproof, but may be obtained suitably treated with cellulose lacquer or with boiled linseed oil, or, alternatively, may be treated in position at the window opening.

Translucent Glass Substitutes.

QUALITIES.—The desirable qualities in translucent glass substitutes are :—

(1) *Reasonable translucency.*—Materials having a transparency and light-transmission approaching that of glass are expensive and difficult to obtain owing to their use in aircraft. The majority of the cheaper translucent materials transmit less light than glass and interfere in some degree with clear vision.

(2) *Weatherproofness.*—The material should not be porous (as is untreated cotton sheeting) or it will become soaked with rain and is also likely to admit wind enough to make interiors uncomfortable in cold weather. Attention should be paid where necessary to the sealing of the edges of the material.

(3) *Life.*—The material should not lose its light-transmission value, suffer from crazing, or become brittle too readily.

(4) *Resistance.*—The material, while standing up to wind pressures, should be capable of being dislodged by blast so that it can be readily replaced. In this, the method of fixing is important (see below). The weaker materials should not be used in large unsupported areas. On such areas a stiffer material is desirable, or the opening should be sub-divided by wooden bars.

(5) *Inflammability.*—Most glass substitutes are combustible. In the majority of buildings a slow-burning material would not be very dangerous.

Roof Glazing.

Only the stiffer materials, *i.e.*, those reinforced with metal mesh, are likely to be suitable for use in roof glazing bars. They should probably be supported below at 2-ft. intervals as recommended for roof glass in R. & E. Department Bulletin C.7. No tests have yet been carried out.

Fixing in Vertical Glazing.

Preliminary blast tests show that if flexible glass substitutes are fixed with nails or staples, the material when displaced is usually torn at the edges. Also where edge fixing is too strong the material may be burst in the centre. The following methods of fixing are accordingly being tested :—

(1) In steel windows a soft non-setting putty or mastic, preferably one that can be scraped off and re-used.

(2) In steel and wood windows, fastening of the edges with adhesive tape.

(3) In wood windows, fixing by ordinary wood glazing beads in the glass rebates, care being taken that the material is not bent round the beads.

(4) In wood windows, fixing on the face of the frame by plasterer's lath or similar wood strip, care being taken that the nails or tacks used to secure the laths do not perforate the edge of the material.

(5) In steel and wood windows, holding of the edges of the material in strip rubber channelling (similar to that used on car windscreens), the rubber strip being either tacked to the wood frame or bedded in hard-setting putty to either wood or steel frames.

Opaque Glass Substitutes.

Where permanent obscuration is required, the following materials can be used :—

(1) *Roof Glazing.*—Galvanised flat-sheet steel, composite sheets of asbestos and steel, hard wallboards. These will stand up to blast pressures considerably greater than those that fracture roof glass. When displaced they can usually be replaced undamaged. They can be fixed in the same way as roof glass.

Thinner and more flexible opaque materials such as combinations of wire mesh and bituminous sheeting, soft wallboards, etc., probably require support beneath as recommended in R. & E. Department Bulletin C.7.

Experiments have shown that flat asbestos-cement sheeting, including the newer "flexible" type, is readily fractured by blast; there is, therefore, little to be gained by using it as a glass substitute in roof glazing bars, since it is likely to be fractured before it is displaced, though, when fractured, it is not so dangerous as glass.

Wallboards require painting or impregnation with preservative to give protection against weather.

(2) *Vertical Glazing.*—The materials described as suitable for roof glazing can also be used in windows. In addition, bituminous sheeting, plywood and plasterboard can be used. The two latter should be painted on the face and on the edges to prevent the soaking-in of moisture. A plasterboard faced with bituminous sheet is obtainable.

As with translucent materials, firm fixing, as, for instance, by nailing, is undesirable. Similar fixings to those recommended for translucent materials are suggested.

The use of existing internal light-weight screens, as recommended in A.R.P. Memorandum No. 12 should not be overlooked. If these are painted on the face and edges, reasonable weather protection will be obtained, though there may be some collection of rainwater at sill level.

Burglary Risks.

Where there is risk of burglary the fixings of glass substitutes may have to be strong and materials used that cannot readily be cut with a knife.

Substitute Materials.

There are many substitute materials on the market, and the provisional list below gives some of their names. The list, however, does not aim at being comprehensive, and simply includes the names of those which are known to the Department to be on the market. The inclusion of a name in the list neither gives nor implies any guarantee by the Ministry of Home Security of the liability at any time of the price or quality or of the availability of the materials. The materials are placed in alphabetical order.

Translucent Materials.

"Armourbex." Cellulose-acetate sheet reinforced with wire mesh. Thickness 22/1000 in. Sheets 55 in. by 24 in. Price approximately 10s. per sq. yd. British Xylonite Co., Ltd., Hale End, London, E.4.

"Celiglas." Moisture-proofed viscose film reinforced with textile fabric. Price 1s. 6d. per sq. yd. British Celilynd, Ltd., Burwell Works, Lea Bridge, Leyton, London, E.10.

"Cellofabric." Cellulose-acetate film reinforced with textile fabric. Prices, 18 in. wide, thickness 5/1000, 13s. per sq. yd.; 3/1000, 7s.; 2/1000, 4s. 6d. Cellofabrics, Ltd., 11, Gillingham-street, London, S.W.1.

"Del Beta." Cellulose-acetate film reinforced with textile fabric. Prices, 18 in. wide, G.R.3, 4s. per sq. yd.; G.R.4, 5s.; G.R.5, 10s. Dobsons and M. Browne, Ltd., Del Beta House, Nottingham.

"Dufaynet." Cellulose-acetate film reinforced with textile fabric. Price, 22 in. wide, 2s. 9d. per sq. yd. Dufay-Chromex, Ltd., P. & O. House, 14-16, Cockspur-street, London, S.W.1.

"Ferrophane." An expanded metal mesh coated with a film of ethyl-cellulose. Sheets 54 in. by 24 in. Price 8s. 3d. per sq. yd. Ferrophane, Ltd., 52, West Ham-lane, London, E.15.

"Marvol." 36 in. and 48 in. wide. Saville, Marvel & Co., Ltd., Port-street Works, Manchester, 1.

"Nuart." Cellulose film reinforced by filet net. Two qualities of net, 40 in. wide. A. & F. H. Parkes (Nottingham), Ltd., Anglo-Scotian Mills, Beeston, Notts.

"Rexine." A cotton fabric, impregnated with cellulose acetate. Price, 40 in. wide, 2s. 9d. per sq. yd. I.C.I. Rexine, Ltd., Imperial Chemical House, Millbank, London, S.W.1.

"Steadoglass." A cotton fabric, impregnated with linseed oil. Price, 36 and 50 in. wide, 3s. 3d. per sq. yd. Also "Super Quality," 27 in. wide. Storeys, Ltd., Lancaster.

"Sunralite." A fine wire mesh coated with a film of cellulose-acetate. Price, 36 in. wide, 4s. 6d. per sq. yd. Sunralite, Ltd., 84, Chestnut-road, London, N.17.

"Textuff." A cotton fabric, impregnated with viscose. Three thicknesses. Price, 37 in. wide 11d. to 1s. 2d. per sq. yd. Textuff, Ltd., c/o Capt. Kilner, Tree Tops, Dollis-avenue, London, N.3.

"Windolite." A fine wire mesh coated with a film of cellulose-acetate. Price, 36 in. wide, 4s. 6d. per sq. yd. Windolite, Ltd., Harlow, Essex.

Unnamed substitutes :—

Impregnated fabric. Three qualities, all 36 in. wide. Prices, 1s. 1d., 1s. 5d., 1s. 8d. per sq. yd. M. Barr & Co., Ltd., 28, Miller-street, Glasgow, C.1.

Plastic reinforced with glass silk. James Clark & Eaton, Scoresby House, Glasshill-street, London, S.E.1.

Impregnated fabric. Price, 37 in. wide, 1s. 1d. per sq. yd. Horrockses Crewdson & Co., Ltd., Yard Works, Preston.

Fabrics impregnated with special lacquer. Jenson & Nicholson, Ltd., Jenson House, Stratford, London, E.15.

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* A.R.P. Memorandum No. 12, "The Protection of Windows in Commercial and Industrial Buildings." H.M. Stationery Office, price 4d.
"Your Home as an Air Raid Shelter." H.M. Stationery Office, price 3d.
R. & E. Bulletin C.4, "The Protection of Glass in Hospitals."
R. & E. Bulletin C.7, "The Protection of Factory Glazing."

Oil cotton fabric. Four qualities, 36 in. wide. Edward Macbean & Co., Ltd., Wellington Mills, Port Dundas, Glasgow, C.4.

Impregnated cotton fabric. Morton Sundour Fabrics, Ltd., 15-19, Cavendish-place, London, W.1.

Impregnated fabric. Winterbottom Book Cloth Co., Ltd., 60, Wilson-street, Finsbury, E.C.2.

Opaque Materials.

"Bennieflex." A combination of wire mesh and bituminous sheeting. Flexible. Price, 36 and 72 in. wide, 3s. per sq. yd. Bennie Lifts, Ltd., 2, Tinworth-street, Albert Embankment, London, S.E.11.

"Durasteel." Flat or corrugated asbestos-cement and metal reinforcement. Prices—flat, sheets 30 in. wide, 6 and 8 ft. long, $\frac{1}{8}$ in., $\frac{1}{4}$ in., $\frac{3}{8}$ in. thick, 9s. to 16s. per sq. yd.; corrugated, 27 in. wide in lengths up to 8 ft., 6s. 9d. per sq. yd. Durasteel Roofs, Ltd., Oldfield-lane, Greenford, Middlesex.

"Kimoloboard." Fire-resisting board of asbestos and diatomaceous earth. Prices, $\frac{1}{4}$ in. thick, 2s. 7d. to 2s. 10d. per sq. yd., according to quantity. Cellactite and British Uralite, Ltd., Higham, Kent.

"Sisalkraft." A 6-ply fibre and bituminous building sheet. Price 4d. per sq. yd. J. H. Sankey & Son, Ltd., Aldwych House, Aldwych, London, W.C.2.

"Steelbestos." A combination of steel and asbestos. Rather flexible. Price, 30 in. wide, 6 ft. and 8 ft. long, 6s. per sq. yd. Asbestos Developments, Ltd., Grove Works, Grovelane, Smethwick, Staffs.

"Turnall" Asbestos Wood. Fire-resisting board. Prices, $\frac{3}{16}$ in. thick, 2s. 11d. per sq. yd.; $\frac{1}{4}$ in. thick, 3s. 8d. per sq. yd. Turners Asbestos Cement Co., Ltd., Trafford Park, Manchester, 17.

A.R.P SCHEMES

LONDON.

CROYDON.—C.B. received M.H. sanction to borrow £12,914 for A.R.P. work.—Council approved £500 for protection work at key sub-stations.—Contracts placed as follows: 15 public surface shelters to accommodate 1,750 persons, Norman Wright (Builders), Ltd., of Portland-rd., South Norwood, at £6,036; 9 further shelters accommodating 138 persons, E. Cox, 10, Whitehorse-rd., Croydon, at an extra cost of £269 10s.; surface shelters: G. Poulton and Sons, Ltd., 11, Westbrook-rd., Thornton Heath; Whyatt (Builders), Ltd., Ravenstone-st., Balham, S.W.12; E. Cox; Walker (Tooting), Ltd., 99, Beddington-la., Croydon; and Gower Builders (London), Ltd., 22, Lime Tree-gr., Shirley.

FINSBURY.—B.C. placed following contracts: Killby and Gayford, Ltd., domestic surface shelters; Constable, Hart and Co., surface shelter, 12-16, Baron-st.; Amalgamated Building Contractors, shelters; J. Lawson and Co., Ltd., shelters; Holland and Hannen and Cubitts, Ltd., shelters; London Co-operative Society, shelters; and Berkeley Electrical Engineering Co., Ltd., electric installation in shelters.

GREENWICH.—B.C. placed following contracts: Henry Kent (Builders), Ltd., 51, Beacon-rd., Hither Green, S.E.13, public shelters at Maryon-rd. and at corner of Blackheath Hill and Point Hill, at £136 and £432, respectively; Harry Groves and Son, Ltd., Stockwell-st., S.E.10, for public shelters at Heathwood-gdns., and Charlton Park-la. (Bull Pits), at £157 and £176 respectively; Halse and Sons, Ltd., 5, Chapel Hill, Woolwich, S.E.18, for public shelters at Maryon-rd., Heathwood-gdns., Charlton Park-la. (Bull Pits), and at corner of Blackheath Hill and Point Hill, for the sums of £135, £155, £160 and £415 respectively; Harry Groves and Son, Ltd., public shelter at 105, Shooter's Hill-rd., at £328, and construction of cleansing stations for £643, £576 and £503 respectively; Messrs. Henry Kent (Builders), Ltd., shelter at Westcombe Hill, at £535; Wm. R. W. Banks, 11, Burnt Ash Hill, Lee, S.E.12, for shelters, at £154 7s.; Henry Kent (Builders), Ltd., for public shelter at Blackheath Park, at £159; Harry Groves and Son, Ltd., for public shelters at Kidbrooke Station and Humber-rd., for the sums of £297 and £176 respectively, and communal shelter at Haddo-st., at £128; Wm. Mills and Sons, Ltd., Woolwich-rd., S.E.10, for public shelter at Lombard Wall, at £462; and Henry Kent (Builders), Ltd., for public shelters at Manorway, corner of Blackwall-la. and Commereil-st., Broadwalk and Rochester-way, at £190, £196, £136 and £171 respectively.

HENDON.—T.C. approved shelters at Gloucester Court, Golders Green-rd., N.W.11, for Beaumont Property Trust, Ltd., and at Windsor Court, Golders Green-rd., N.W.11, for Langford Property Co., Ltd. Applicant for both schemes, R. M. Pigott.

HESTON AND ISLEWORTH.—T.C. made application to B. of E. and M.H. for sanction to borrowing £570 for additional costs in providing shelter accommodation at Alexandra and Bulstrode schools, and £170 for same at Spring-gr. junior school.—Contracts placed with Speirs, Ltd., for communal shelters to accommodate 1,188 persons, at £2,844, and Roger Miller for communal shelters to accommodate 210 persons, at £428 13s.—Proposals submitted to County Civil Defence Committee for further public shelters.—County Civil Defence Committee approved in principle adaptation of premises, as combined ambulance and stretcher party depot. B.S.'s estimate, £407.

HOLBORN.—B.C. accepted Higgs and Hill, Ltd., for further work at National Hospital first-aid post, at £481.—Smith and Crawford, Ltd., carrying out, at £106 10s., electrical installations in public shelters.—Further contracts for shelter works placed with C. J. Hawkins and Co.; C. E. Norris and Sons, Ltd.; McShee, Ltd.; and H. A. Kellaway, Ltd. Shelter accommodation proposed at National, Raglan, Shelbourne, Gresham and Shaftesbury hotels.

HORNCHURCH.—U.D.C. received Regional Commissioner and Essex C.C. approval to 5 public shelters for 2,600 persons.—Essex C.C. stating intention to provide air raid protection for children attending Cranham temporary council schools.—Shelters to be provided at following stations: Upminster station, for 250 persons; Upminster Bridge station, for 100 persons; Hornchurch station, for 200 persons; and Rainham station, for 150 persons.—B.E. of Romford informed U.D.C. that his Council wished to erect an A.F.S. action station in Brentwood-rd.—S. to proceed forthwith to construct bomb-proof shelter for purpose of affording protection to documents of Council.

HORNSEY.—T.C. placed following contracts with W. Norman and Son, Ltd., for surface shelters; and James Webb and Son (Builders), Ltd., for surface shelters.

SOUTHGATE.—T.C. placed contracts with E. Knifton, Ltd., and Moreton and Sons, Ltd., at £24,436, for shelters.

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PROVINCIAL.

ALDERSHOT.—Emergency Committee of T.C. accepted a tender for 21 communal shelters.—Tenders for 10 communal shelters, at £1,092, accepted.

ALFRETON.—U.D.C. to erect shelters at Somercotes and Riddings.

BEDLINGTON.—U.D.C. pressing Ministry of Home Security to sanction further shelters.

BELFAST.—Corporation, following consultation with Northern Ireland Ministry of Public Security, to erect further 100 shelters in suburban areas.—It is proposed to instal seating accommodation and electric lighting in all public shelters.

BEVERLEY.—Contracts been accepted by R.D.C. for £5,980 for shelters in southern parishes of rural area, and £2,389 for shelters in central area.

BLACKWELL.—R.D.C. to prepare plans for shelters for northern area. Plans by A. H. Elliott, S., Chesterfield-rd. South, Mansfield.

BOSTON.—T.C. approved shelter, Petticoat-la., adjoining Emporium, Marks and Spencer, Ltd., Michael House, Baker-st., London, W.1.

BROMSGROVE.—U.D.C. approved scheme for household shelters and placed contracts with G. Nokes and Sons, 293, Lordswood-rd., Bearwood, Birmingham, and Fox, Plaister of Bromfield. — U.D.C. propose strengthening houses and building brick baffle walls for shelters.

CARDIFF.—R.D.C. has accepted tenders for provision of 74 communal shelters at Whitchurch.

CARLISLE.—T.C. approved shelters at City General Hospital and nurses' home, at £1,125, and at George-st. clinic, at £510.—Plans prepared for 465 domestic communal shelters, at £43,086. Plans by P. Dalton, City E., 18, Fisher-st.

CHESTERFIELD.—R.D.C. propose 16 communal public shelters in New Tupton for 768 persons and strengthening basements in Cross-st., New Tupton, for shelters. Plans by J. B. Wikeley, M.I.M.&Cy.E., S.—T.C. propose concrete lining to 1,000 Anderson steel shelters.

CLAYTON-LE-MOORS.—U.D.C. to erect domestic communal shelters for 5,000 persons, at £10,000. Plans by T. W. Broad, S.

COSELEY.—U.D.C. to erect domestic communal shelters.

DARLINGTON.—T.C. received sanction to borrow £5,053 for school shelters.

DEWSBURY.—Approval been given for erection of 223 shelters to accommodate 8,036 people, at £15,136.

DONCASTER.—R.D.C. started on scheme recently approved for shelters to cost £25,000.

DRIFFIELD.—U.D.C. erecting 16 public shelters, at £2,668.

DROITWICH.—T.C. propose domestic shelters or protective work to houses for shelter accommodation. Plans by R. E. Hulse, B.S.

FARNHAM.—U.D.C. to provide public shelter in basements adapted for the purpose, at £599, giving accommodation for 495 persons. A further 17 to accommodate 816, at £1,700, to be built.

FELLING-ON-TYNE.—U.D.C. to build public shelter at Heworth for 100 people. Plans by H. Fawcett, Surveyor and Architect.

GOSFORTH.—Contractors for domestic shelters are T. E. Ridley, 7, Moor-cres., and W. Jackson, 5, Audley-rd.

GRANTHAM. — W. Foster and Son, builders, 41, Castlegate, received contract for domestic communal shelters in Waltongdns., for T.C. Plans by P. A. Benn, B.S.

HAWARDEN.—R.D.C. to erect domestic communal shelters.

HORNCASTLE.—U.D.C. to erect shelter for 95 persons in Conging-st. Plans by F. Weeber, S.—U.D.C. propose shelter for Manor House Council school.

JARROW-ON-TYNE.—E.C. received B. of E. consent to build further school shelters. Plans by J. S. Weir, B.E.

LIMAVADY.—Governors of Roe Valley Hospital accepted tender of Robert Holmes, Limavady, at £349 16s. 9d., for A.R.P. work at hospital. Plans by M. M'Quigg, E.

LINDSEY.—E.C. propose trenches at Alford council schools, and shelter for junior council school at Horncastle.

MIDDLESBROUGH.—T. Crawford, 82, Borough-rd., prepared plans for shelter at St. Mary's Presbytery, William-st.

MORPETH.—T.C. approved plan by Boots, Ltd., Bridge-st., for staff shelter.

NEWBURN-ON-TYNE.—U.D.C. to build more shelters. Plans by J. W. Weatherley, S.

NEWCASTLE-ON-TYNE.—G. G. Carr, 97, Bk. New Bridge-st., Newcastle-on-Tyne, contractor, at £383 10s., for A.R.P. protective works to East End, Central, and Arthur's Hill police stations for City Council.

NEWCASTLE-UPON-TYNE. — W. W. Kelsey, Hanover-sq., secured contract for basement shelter at works of Newcastle Coachbuilders, Ltd., Claremont-rd.—City Council to build shelter in Grainger Market by direct labour. Plans by Percy Parr, City E.—E.C. to make structural alterations and additions at Middle-st. and Wharrier-st. schools. F. Harvey, Education Offices, Northumberland-rd., is architect to Committee.

OMAGH.—U.D.C. decided to erect shelter in High-st.

PORTMADOC.—U.D.C. to prepare scheme for public shelters. Plans by E. I. Pryce, S.

ROCHDALE.—T.C. propose domestic communal shelters in lieu of Anderson steel shelters. Plans by S. H. Morgan, M.I.C.E., B.S.

SALFORD.—T.C. to provide shelter accommodation for travelling public at railway station, New Bailey-st. and Ordsall-la. railway station, Hampton-st.

SEISDON.—R.D.C. to erect 48-person shelter at Stewpony. — Basements and cellars to houses to be converted into shelters at Kinver.

SKEGNESS.—U.D.C. to erect domestic communal shelters and public shelters. Plans by R. H. Jenkins, M.I.M.&Cy.E., S., Ida-rd.

SOUTH SHIELDS.—Contracts for communal street shelters let to Henderson Bros., Smith-st., Tyne Docks, South Shields, and J. T. Armstrong and Son, back Talbot-rd., South Shields.

STOKESLEY.—R.D.C. to build 16 communal shelters at Ormesby. Plans by H. Wynne Potts, S.

SUNDERLAND.—T.C. to provide shelters at clinics. Plans by J. E. Lewis, B.E.

SWINTON AND PENDLEBURY.—T.C. propose public shelters. Plans by A. Cordwell, B.S.

THORNABY-ON-TEES. — T.C. to line Anderson shelters with concrete to prevent flooding.

TYRONE.—An A.R.P. scheme for County hospital, prepared by Ferguson and M'Ilveen, architects, been approved.

WAKEFIELD.—R.D.C. to build 50 surface shelters in seven villages. Plans by W. E. Massie, S.

WIGAN.—R.D.C. propose shelters for Shevington council schools.

WIGSTON. — R.D.C. propose public shelters.

WORCESTERSHIRE. — C.C. propose shelters for council schools in Hagley area. H. Rowe and Son, Acting County Architects, Worcester.

SCOTLAND.

BLAIRGOWRIE.—Blairgowrie and Rattray T.C. agreed to ask C.C. to erect 4 surface shelters—2 in Wellmeadow, 1 in High-st. and 1 in Rattray. Shelters will provide accommodation for 200.

FORT WILLIAM.—Corporation to provide shelters. Plans by A. N. Tannahill, Burgh Architect.

GLASGOW.—Plans prepared for shelter for J. P. Turner and Son, 100, West Regent-st. Contractors are D. M. Chalmers and McGill, Glasgow. — Corporation accepted tender of £1,378 for cleansing station. Plans by T. Somers, architect, Office of Public Works. Contractors, J. Emery and Sons, Ltd., Glasgow.

HELENSBURGH.—Corporation to provide shelters. Plans by J. S. Stirling, Burgh Architect.

RENFREWSHIRE. — C.C. to provide shelters in the county. J. Coutts, architect, 8, Hunter-st., Paisley.

ST. ANDREWS (FIFESHIRE). — New shelters to be provided by Corporation, at £1,218. R. F. Buick, Burgh Architect and Engineer. Contractors, F. D. Baillie and Co., St. Andrews.

NEW BUILDINGS IN LONDON

CROYDON.—ALTERATIONS.—C.B. to discuss a scheme with the M.H. for alterations at Mayday hospital to cost £1,300.

CROYDON.—SCHOOLS.—The E.C. has reported that the Council have been authorised to exercise to the full extent the borrowing powers in respect of the erection, etc., of the following schools:—Purley Oaks, rebuilding; Lady Edridge, rebuilding; Benson, extension; and Kingsley, extension.

EUSTON-ROAD.—ADAPTATION.—The B.C. has approved, subject to sanctions being obtained, the adaptation and equipment of 102, Euston-road for use as a temporary lending library. The estimated cost is about £1,500.

HENDON.—BUILDING.—The B.S. has been instructed to proceed with the carrying out of the works necessary to provide the additional accommodation at the isolation hospital. The Council has accepted for a store for the Town Hall records, the tender of Messrs. H. Pickrill, Ltd., 8, Station-buildings, Wealdstone, at £1,162.

HORNSEY.—BUILDING.—The T.C. has placed the following contracts: Messrs. Stevens and Sons for repairs to the Stroud Green school; Messrs. Newby Bros. for repairs to the South Harringay school; Messrs. Toms and Bishop, Ltd., for the external painting of council dwellings, and Messrs. Willmott and Sons for repairs to council dwellings.

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CURRENT AND PROPOSED BUILDING WORK*

Bakewell. — Haddon Hospital Board appointed Naylor, Sale and Widdows, St. Mary's-chas., St. Mary's Gate, Derby, as architects for proposed extensions to hospital buildings in succession to late G. M. Eaton.

Chesterfield.—W. Aland, 19, Romney-av., South Shore, Blackpool, proposes sports stadium and greyhound racing track.

Colwyn Bay.—North Wales branch of Y.M.C.A. propose 4 additional halls and canteens for Forces, at £5,000.

Coventry.—T.C. propose youth centre.—E.C. has appointed S. J. Oldham (L.), architect, Chester House, High-st., to prepare plans for another youth centre. Plans submitted to the National Fitness Council.—D. E. E. Gibson (A.), City Architect, 1a, Warwick-row, prepared revised plans for junior and infants' school, at £33,800.—Architect also prepared preliminary sketch plans for school to cost £34,000.

Darlington.—T.C. received consent from Electricity Commissioners to borrow money required for extensions to generating station.—J. Shewell and Co. (Successors), Ltd., Darlington, to build shed in Allen-st.

Dewsbury.—T.C. approved: Alterations to bank, Barclay's Bank, Ltd.

Doncaster.—T.C. propose additional storey to fire station. Plans by F. O. Kirby, B.E., 2, Priory-pl.

Farnborough.—Emergency Committee of U.D.C. reported that preliminary estimates, plans, etc., for 50 houses been forwarded to M. of H., and that tenders will be invited.

Fleetwood.—Police Court granted application for alterations to Regal Hotel, Cleveleys.

Greenwich.—C.B. approved: store building at Granite Wharf; building at Billingsgate-st.; alterations at Victoria-works; extensions at Greenwich Metal Works.

Hendon.—T.C. approved: Valve house, Northmet Power Co.; alterations to bakery for A. E. Spurrier, applicant, A. J. Butcher.

Hinckley.—U.D.C. approved additions to works, Midland Packing Case Co.

Hornchurch.—U.D.C. approved 2 semi-detached bungalows, C. J. Bywater.

London.—C.C. recommend following:—Additional water units for fire service, £9,600; air-raid shelters in certain schools, £5,000; facilities for drying hose at fire substations, £4,990; emergency hospital scheme, accommodation, £17,000; shelters at Shirley residential school, £1,770; emergency water supplies for fire service, £1,300; fire precautions at County Hall, £870; protection of fire service observation posts, £724; shelters at Cooper's Hill offices, £441.

Manchester.—T.C. approved plans: Extensions to Emergency Hospital. Adshead, Topham and Adshead, architects, 14, Ridgefield.

Mexborough.—Board of Management of Montague Hospital acquired premises for conversion into annexe for temporary hospital.

Middlesbrough. — Middlesbrough Co-op Society, Ltd., Clifton-st., is to carry out alterations to premises in West-la. Plans by Society's Architect's Dept. been approved.

North Cotswold.—R.D.C. decided to proceed with 39 houses for agricultural workers.

Southgate.—T.C. propose £250 for repairs to roof of indoor bowling green.

Stockton-on-Tees.—Alterations proposed to "Station Hotel," Bishopton-la., for W. Younger and Co. Architect, S. H. Clarke, St. Margaret's, Eaglescliffe; Messrs. Imeson and Finch, Ltd., Bridge-rd., to adapt premises as new factory to plans by G. P. Stainsby, 25, High-st.

Taunton.—T.C. approved: Alterations to houses, Colborne's Estates, Ltd.; alterations to houses, Mrs. Heaton-Renshaw; alterations to factory, Avimo, Ltd.; garages, S. Skinner.

* See also List of Contracts Open.

**** In these lists every care is taken to ensure that information given is accurate and up to date, but it may occasionally happen that, owing to building owners taking the responsibility of commencing work before plans are finally approved by the local authorities, "proposed" works at the time of publication have been actually commenced.**

CONTRACTS OPEN

For some contracts still open, but not included in this list, see previous issues. Those with an asterisk are advertised in this number. Certain conditions beyond those given in the following information are imposed in some cases, such as that advertisers do not bind themselves to accept the lowest or any tender, that a fair wages clause shall be observed, that no allowance will be made for tenders; and that deposits are returned on receipt of a bona-fide tender, unless stated to the contrary. The dates at the head of paragraphs are those for the submission of tenders; a dagger (†) denotes closing date for applications; the name and address at the end refer to the person from whom particulars may be obtained. Abbreviations: (A.) for A.R.I.B.A.; B. of E. for Board of Education; B.C. for Borough Council; B.E. for Borough Engineer; B.S. for Borough Surveyor; C. for Clerk; C.B. for County Borough; C.C. for County Council; C.E. for County Engineer; C.S. for County Surveyor; D.S. for District Surveyor; E. for Engineer; E.C. for Education Committee; (F.) for F.R.I.B.A.; (L.) for L.R.I.B.A.; M.W.B. for Metropolitan Water Board; M.H. for Ministry of Health; M.T. for Ministry of Transport; P.C. for Parish Council; R.D.C. for Rural District Council; S. for Surveyor; T.C. for Town Clerk and Town Council; and U.D.C. for Urban District Council.

BUILDING.

SEPTEMBER 27.

Dewsbury T.C.—Police garage. Borough Architect.

Sheffield T.C.—Engineering workshop and foundry block, contract No. 1, for proposed college of art and technology, Arundel-st. W. Geo. Davies (F.), City Architect. Dep. £2.

SEPTEMBER 28.

Andover T.C.—12 domestic shelters and 6 wardens' posts. B.S.

Cowes U.D.C.—Shelters at Cowes and East Cowes fire stations. E. and S., Northwood House.

SEPTEMBER 30.

Brierley Hill U.D.C.—Approx. 300 domestic surface shelters. R. H. J. Comber, E. and S., Hawbush House.

Essex C.C.—Replacement of sandbag revetments by brick or concrete block protective walls at Oldchurch hospital, Romford. J. Stuart (F.), County Architect, Chelmsford. Dep. £1 1s.

Halifax C.B.—Surface shelters at Ling Bob playing fields. D. T. Lloyd Jones, B.E., Crossley-st. Dep. £1 1s.

North Walsham U.D.C.—13 communal domestic shelters. W. Morris, architect and surveyor, Surveyor's Office, Bacton-rd. Dep. £1 1s.

Westmorland C.C. — Laundry improvements, Kirkby Stephen Institution. H. B. Greenwood, Clerk, County Hall, Kendal.

OCTOBER 1.

Cwmbran U.D.C.—Seven brick surface shelters. T. J. Price, S.

Hindley U.D.C.—80 communal shelters. O. P. Abbott, S.

OCTOBER 2.

Burton-upon-Trent C.B.—Alterations to floor of cowshed at Blakeley Farm, Etwall, near Derby. B.E. and S.

Derby C.B.—Waterproofing of 2,000 Anderson shelters. B.E. and S., 15, Tenant-st. Dep. £2 2s.

Gillingham T.C.—Partly sunken brick domestic shelters. B.E. and S. Dep. £1 1s.

Ruislip-Northwood U.D.C.—Tanking out in concrete of Anderson steel shelters. E. and

OCTOBER 5.

Lincoln (Parts of Kesteven) C.C.—Bungalow at Stainby. C. B. Metcalfe (F.), County Architect, Sleaford.

OCTOBER 11.

Newport, I. of W.—Portion of new fire station. H. G. W. Cook, B.E. and S.

OCTOBER 12.

Okehampton R.D.C.—Public conveniences at North Tawton. L. R. Chapman, Building S., 1, Station-rd. Dep. £1 1s.

OCTOBER 14.

Wakefield R.D.C.—50 surface shelters W. E. Massie, E. and S.

NO DATE.

Pocklington R.D.C.—10 shelters. S.

PAINTING, ELECTRIC LIGHTING, HEATING, &c.

SEPTEMBER 27.

Edinburgh T.C.—Instaliation of electric lighting in farm buildings at Bangour Farm, West Lothian. Engineer's Office, Dewar-pl. Dep. £1 1s.

SEPTEMBER 28.

Ormskirk U.D.C.—Painting works to council property. S.

SEPTEMBER 30.

Axminster R.D.C.—Painting reservoir at Raymonds Hill. C. Forward, Clerk.

Birmingham T.C.—Exterior painting work at Erdington House, Erdington. Public Assistance Officer, 102, Edmund-st.

Dartford T.C.—Exterior painting of 242 houses on Corporation's housing estates. J. J. Hurtley, T.C. Dep. £2 2s.

Metropolitan Water Board.—Heating installation at Hampton. Chief E., Rosebery-av., E.C.1.

OCTOBER 1.

Market Harborough R.D.C. — Exterior painting of 24 houses. C. A. Kortegas, S., Kilworth, Beauchamp.

OCTOBER 2.

West Riding C.C.—Internal decorations at Listerdale maternity home, Wickersley, near Rotherham. West Riding Architect, Wakefield.

OCTOBER 4.

Newport (Isle of Wight) T.C.—Installation of electric lighting to approx. 48 school shelters. H. G. W. Cook, B.E. and S., 38, Quay-st.

OCTOBER 10.

***Feltham U.D.C.**—Demolition, reconstruction and renovation of chimney stacks to 50 houses, at Bedfont-ln. and Ashmead-rd. E. and S.

NO DATE.

West Riding E.C. — Repairs to eaves, gutters, etc., at Wombwell Jump Council school. C. Ellison, Divisional Clerk, Education Office, Rock House, Swinton, Mexborough.

MATERIALS.

SEPTEMBER 30.

Mersey Railway Co.—Builders' materials. R. Varley, General Manager and Engineer, Central Station, Birkenhead.

ENGINEERING, IRON AND STEEL.

OCTOBER 7.

Isle of Ely C.C.—Culvert 600 yds. and culvert 1 mile east of Boots Bridge. C.S., March.

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OCTOBER 19.

North Cork Board of Health and Public Assistance.—Millstreet water supply scheme. D. C. Murphy, Sec., County Hospital, Mallow. Dep. £20.

ROAD, SEWERAGE AND WATER WORKS.

SEPTEMBER 30.

Cardiff R.D.C.—Street improvement works in Caedelyn-rd. (part of), Whitchurch. W. Farrow, E. and S., Park House, 20, Park-pl.

Wexford T.C.—Improvements to waterworks. Delap and Waller, consulting engineers, 16, Molesworth-st., Dublin. Dep. £10 10s.

OCTOBER 1.

Nantwich R.D.C.—Laying of water mains, parishes of Cholmondeston and Wettenhall. H. Crabtree, E., 21, Pillory-st.

OCTOBER 4.

Cardiff T.C.—42-in. dia. cast-iron pipe line, approx. 1¼ miles long from point on River Rhymney to Corporation's Roath power station. Geo. W. Cover, M.Inst.C.E., Water E. Dep. £2.

OCTOBER 7.

Birmingham T.C.—Laying underground, testing and putting to work of cast-iron water pipework, etc., at power station, Lea Marston. F. Forrest, Chief Engineer and Manager, 14, Dale End, Birmingham, 4. Dep. £2.

OCTOBER 11.

Long Eaton U.D.C.—Sewage disposal works. Sands and Walker, consulting engineers, Milton-chams., Nottingham, and H. Raven, E. and S. Dep. £5 5s.

Public Appointments.

OCTOBER 14.

***Easington R.D.C.**—Temporary Architectural Assistant in engineer and surveyor's dept. J. J. Waring, C.

BUILDING ILLUSTRATED

KINGSTON HIGH SCHOOL, HULL.

For this school the general contractors were Tarran Industries, Ltd., of Hull and London. Sub-contractors and suppliers engaged were:—

Heating, Humber Heating Co., Ltd., Hull; plumbing, F. P. Tarran, Ltd., Hull; electric lighting, Booker and Tarran, Ltd., Hull; steelwork, King and Co., Ltd., Hull; R.C. floors, Rapid Precast Floors, Ltd.; cast stone, Kingston Cast Stone Co., Ltd., Hull; sanitary fittings, Adamsez, Scotswood-on-Tyne (urinal slabs), Shanks and Co., Ltd., Manchester, and J. Duckett and Son, Ltd., Burnley; windows, Helliwell and Co., Brighouse, Yorks; gymnasium fittings, Niels Larsen and Son., Ltd., Leeds; laboratory fittings, A Bentley, London; classroom fittings, North of England School Furnishing Co., Ltd., Darlington; paint, Sissons Bros. and Co., Ltd., Hull; asphalt and dampcourses, Limmer and Trinidad Lake Asphalt Co., Ltd.; entrance gates, T. W. Palmer and Co., Merton Abbey, London; goods lift, Thornborough and Son, Manchester; handrails, Dixon, Powner and Sons, Leeds; terrazzo, O. Toffolo and Son, Ltd., Hull; faience, Leeds Fireclay Co., Ltd., Leeds; lighting fittings, General Electric Co., Falk, Stadelmann and Co., Ltd., Leeds, and Troughton and Young, Ltd., London; rubber flooring, Asbestos and Rubber Co., Hull; doors, Flexo-Plywood Industries, Ltd., London, and Flexwood, London; fibrous plaster, J. W. Wilson and Son, Mansfield; classroom dadoes, Modern Surfaces, Ltd., London; bricks, R. Thomas and Co., Ltd., Scunthorpe; partitions, Foamagg, Scunthorpe; flooring, Hollis Bros. and Co., Hull (woodblock), Greenwood Flooring Co., Riddings, Derbyshire; patent glazing, Furniss and Co., Little Royde, Yorks; clocks (electric), Gent and Co., Ltd., Leicester, cloakroom fittings, Isaac Robson and Co., Ltd., Leeds; electric water heaters, Hull Corporation Electricity Dept.; and boilers, Ideal Boilers, Ltd., Hull.

B.S. Specifications.

British Standards Institution have issued from 28, Victoria-street, London, S.W.1, the following B.S. Specificatons:—

Flame-proof Electric Lighting Fittings, B.S. 889-1940. Price 2s. 3d. (post free).

Bolted Flame-proof Cable-couplers, B.S. 912-1940. Price 2s. 3d. (post free).

RATES OF WAGES IN THE BUILDING TRADE

AS AND FROM 1st JUNE, 1940

[Every endeavour is made to ensure accuracy, but we cannot be responsible for errors]

	Craftsmen.	Labourers.
Aberavon	1/9	1/4½
Aberdare	1/9	1/4½
Abergavenny	1/7½	1/3
Abingdon	1/9	1/4½
Accrington	1/5½	1/1½
Aldeburgh	1/7½	1/3
Aldershot	1/9	1/4½
Alfreton	1/8½	1/5½
Alnwick	1/9	1/4½
Altrincham	1/8½	1/3½
Amble	1/7½	1/3
Amersham	1/9	1/4½
Ammanford	1/7	1/2½
Andover	1/7	1/2½
Ardingley	1/7	1/2½
Arundel	1/7	1/2½
Ascot	1/9	1/4½
Ashby-de-la-Zouch	1/7	1/2½
Ashford (Kent)	1/9	1/4½
Ashford (Middlesex)	1/8½	1/3½
Ashington	1/9	1/4½
Ashtead	1/9	1/4½
Ashton-under-Lyne	1/7	1/2½
Aylesbury	1/6	1/2
Aylsham	1/7	1/2½
Bagshot	1/7	1/2½
Banbury	1/9	1/4½
Barnsley	1/7	1/2½
Barnstaple	1/9	1/4½
Barrow-in-Furness	1/9	1/4½
Barry	1/7	1/2½
Basingstoke	1/8½	1/3½
Bath	1/9	1/4½
Batley	1/7½	1/3
Beaconsfield	1/5½	1/1½
Beccles	1/8½	1/3½
Bedford	1/7	1/2½
Berkhamsted	1/8½	1/3½
Berwick	1/9	1/4½
Beverley	1/7½	1/3
Bexhill-on-Sea	1/7	1/2½
Bideford	1/7	1/2½
Biggleswade	1/6½	1/2½
Billericay	1/7	1/2½
Birchington	‡§1/11	¶
Birkenhead	1/9	1/4½
Birmingham†	1/9	1/4½
Bishop Auckland	1/8	1/3½
Bishops Stortford	1/9	1/4½
Blackburn	1/9	1/4½
Blackpool	1/9	1/4½
Blyth	1/7	1/2½
Bognor Regis	1/9	1/4½
Bolton	1/8	1/3½
Bournemouth	1/7	1/2½
Bracknell	1/9	1/4½
Bradford	1/6	1/2
Bradford-on-Avon	1/7	1/2½
Braintree	1/8½	1/3½
Brentwood	1/7½	1/3
Bridgwater	1/8½	1/3½
Bridlington	1/9	1/4½
Brighouse	1/8	1/3½
Brighton	1/9	1/4½
Bristol	1/7	1/2½
Broadstairs	1/8½	1/3½
Bromsgrove	1/9	1/4½
Buckley	1/5	1/1½
Bungay	1/5½	1/1½
Burnham-on-Crouch	1/9	1/4½
Burnley	1/9	1/4½
Burslem	1/9	1/4½
Burton-on-Trent	1/9	1/4½
Bury	1/6½	1/2½
Bury St. Edmunds	1/8½	1/3½
Buxton	1/7½	1/3
Byfleet	1/9	1/4½
Cambridge	1/7	1/2½
Canterbury	1/9	1/4½
Cardiff	1/9	1/4½
Carlisle	1/9	1/4½
Carnforth	1/9	1/4½
Castleford	1/9	1/4½
Caterham	1/6	1/2
Chard	1/8	1/3½
Chatham	1/8½	1/3½
Chelmsford	1/8	1/3½
Cheltenham	1/8½	1/3½
Chepstow	1/8	1/3½
Chertsey	1/9	1/4½
Chester	1/9	1/4½
Chesterfield	1/7	1/2½
Chichester	1/9	1/4½
Chorley	1/6½	1/2½
Cirencester	1/7	1/2½
Clacton	1/9	1/4½
Clevelevs		
Clitheroe	1/9	1/4½
Cobham (Surrey)	1/8	1/3½
Colchester	1/8½	1/3½
Colwyn Bay	1/8	1/3½
Congleton	1/8½	1/3½
Coventry	1/9	1/4½
Cranbrook	1/7	1/2½
Cranleigh	1/7	1/2½
Crawley	1/7	1/2½
Crewe	1/8½	1/3½
Cromer	1/6	1/2
Crowborough	1/7	1/2½
Cuckfield	1/7	1/2½
Darlington	1/9	1/4½
Darwen	1/9	1/4½
Daventry	1/7½	1/3
Deal	1/7	1/2½
Denbigh	1/8	1/3½
Derby	1/9	1/4½
Devizes	1/6	1/2
Dewsbury	1/9	1/4½
Didcot	1/7	1/2½
Diss	1/5½	1/1½
Doncaster	1/9	1/4½
Dorchester	1/6½	1/2½
Dorking	1/7½	1/3
Dover	1/7	1/2½
Dovercourt	1/7	1/2½
Driffield	1/7½	1/3
Droitwich	1/8½	1/3½
Dudley	1/9	1/4½
Dunstable	1/7½	1/3
Durham City	1/9	1/4½
Eastbourne	1/8	1/3½
E. Glam. (Mon. Val.)	1/9	1/4½
East Grinstead	1/7	1/2½
Edenbridge	1/7	1/2½
Ely	1/6	1/2
Epping	1/9	1/4½
Exeter	1/8½	1/3½
Exmouth	1/7½	1/3
Fakenham	1/6	1/2
Falmouth	1/7½	1/3
Fareham	1/8	1/3½
Faversham	1/7	1/2½
Felixstowe	1/8	1/3½
Filey	1/7½	1/3
Fleetwood	1/9	1/4½
Flint	1/9	1/4½
Folkestone	1/7	1/2½
Frinton-on-Sea	1/7	1/2½
Frome	1/6	1/2
Gainsborough	1/8	1/3½
Gateshead	1/9	1/4½
Gillingham (Kent)	1/8	1/3½
Glossop	1/9	1/4½
Gloucester	1/8½	1/3½
Godalming	1/7	1/2½
Goole	1/9	1/4½
Gosport	1/8½	1/3½
Grantham	1/8	1/3½
Gravesend	1/8½	1/3½
Great Yarmouth	1/7	1/2½
Grimsby	1/9	1/4½
Guildford	1/7	1/2½
Guilsborough	1/7½	1/3
Halifax	1/9	1/4½
Hanley	1/9	1/4½
Harpenden	1/8	1/3½
Harrogate	1/9	1/4½
Hartlepools	1/9	1/4½
Harwich	1/7	1/2½
Haslemere	1/7	1/2½
Hastings	1/7	1/2½
Hatfield	1/8½	1/3½
Haywards Heath	1/7	1/2½
Hednesford	1/8½	1/3½
Hemel Hempstead	1/8	1/3½
Henley-on-Thames	1/7	1/2½
Hereford	1/7	1/2½
Herne Bay	1/7	1/2½
Hertford	1/8½	1/3½
Heysham	1/9	1/4½
Hitchin	1/8	1/3½
Hoddesdon	1/8½	1/3½
Holt (Norfolk)	1/5½	1/1½
Horley	1/7	1/2½
Horsham	1/7	1/2½
Horwich	1/9	1/4½
Huddersfield	1/9	1/4½
Hull	1/9	1/4½
Hunstanton	1/6	1/2
Huntingdon	1/6½	1/2½
Ilfracombe	1/7	1/2½
Ingatestone	1/7½	1/3
Ipswich	1/8½	1/3½
Isle of Thanet	1/7	1/2½
Isle of Wight	1/6½	1/2½
Keighley	1/9	1/4½
Kenilworth	1/9	1/4½
Kettering	1/8½	1/3½
Kidderminster	1/7	1/2½
King's Lynn	1/9	1/4½
Kirkham	1/8½	1/3½
Knowle	1/9	1/4½
Lancaster	1/9	1/4½
Leamington	1/8	1/3½
Leatherhead	1/9	1/4½
Leeds	1/9	1/4½
Leicester	1/6	1/2
Leighton Buzzard	1/8	1/3½
Letchworth	1/7	1/2½
Lewes	1/8	1/3½
Lichfield	1/9	1/4½
Lincoln	1/7	1/2½
Littlehampton	‡§1/11	¶
Liverpool	1/8	1/3½
Llandudno	1/9	1/4½
Llanelly		
London—		
12m. radius	*1/10½	1/5½
12-15 m. radius	*1/10	1/5
Long Eaton	1/9	1/4½
Longton	1/9	1/4½
Loughborough	1/7½	1/3
Louth	1/7	1/2½
Lowestoft	1/8½	1/3½
Luton	1/8½	1/3½
Macclesfield	1/8	1/3½
Maidenhead	1/7½	1/3
Maidstone	1/7½	1/3
Malvern	1/9	1/4½
Manchester	1/6	1/2
Manningtree	1/9	1/4½
Mansfield	1/6	1/2
March	1/7	1/2½
Margate	1/8	1/3½
Market Harborough	1/7½	1/3
Matlock	1/5½	1/1½
Melton Constable	1/8	1/3½
Melton Mowbray	1/9	1/4½
Merthyr	1/9	1/4½
Middlesbrough	1/9	1/4½
Middleton	1/8½	1/3½
Middlewich	1/7½	1/3
Milford Haven	1/9	1/4½
Morecambe	1/9	1/4½
Morley	1/6	1/2
Mundesley	1/8½	1/3½
Nantwich	1/9	1/4½
Nelson	1/8½	1/3½
Newark-on-Trent	1/7	1/2½
Newbury	1/9	1/4½
Newcastle-on-Tyne	1/9	1/4½
Newcastle-u.-Lyme	1/7	1/2½
New Forest	1/7	1/2½
Newmarket	1/9	1/4½
Newport, Mon.	1/7	1/2½
Newport Pagnell	1/9	1/4½
Northampton	1/9	1/4½
Norwich	1/9	1/4½
Nottingham	1/9	1/4½
Nuneaton	1/7½	1/3
Oakham	1/9	1/4½
Oldham	1/9	1/4½
Ormskirk	1/8½	1/3½
Oxford	1/7½	1/3
Oxted	1/8½	1/3½
Paignton	1/8½	1/3½
Peterborough	1/9	1/4½
Plymouth	1/9	1/4½
Pontefract	1/9	1/4½
Pontypridd	1/9	1/4½
Port Talbot	1/8½	1/3½
Portsmouth	1/9	1/4½
Preston	1/7	1/2½
Pulborough	1/7	1/2½
Ramsgate	1/8½	1/3½
Reading	1/8½	1/3½
Redditch	1/7½	1/3
Redhill	1/7½	1/3
Ripon	1/9	1/4½
Rochdale	1/8	1/3½
Rochester	1/9	1/4½
Rugby	1/6	1/2
Saffron Walden	1/8½	1/3½
St. Albans	1/9	1/4½
St. Helens	1/6½	1/2½
St. Neots	1/6½	1/2½
Salisbury City	1/8	1/3½
Salisbury Plain	1/7½	1/3
Sawbridgeworth		
Saxmundham	1/5½	1/1½
Scarborough	1/8½	1/3½
Scunthorpe	1/9	1/4½
Selby	1/7½	1/3
Sevenoaks	1/7	1/2½
Sheerness	1/9	1/4½
Sheffield	1/9	1/4½
Shipley	1/8½	1/3½
Shoeburyness	1/8	1/3½
Shoreham	1/8½	1/3½
Shrewsbury	1/7	1/2½
Sittingbourne	1/8	1/3½
Skegness	1/7½	1/3
Sleaford	1/8	1/3½
Slough	1/8½	1/3½
Southampton	1/8½	1/3½
Southend-on-Sea	1/9	1/4½
Southport	1/9	1/4½
South Shields	1/7	1/2½
Spalding	1/8½	1/3½
Stafford	1/8	1/3½
Staines	1/8	1/3½
Stamford	1/8	1/3½
Stevenage	1/9	1/4½
Stockport	1/9	1/4½
Stockton-on-Tees	1/9	1/4½
Stoke-on-Trent	1/9	1/4½
Stourbridge	1/8½	1/3½
Stourport	1/6	1/2
Stowmarket	1/8	1/3½
Stratford-on-Avon	1/8	1/3½
Stroud	1/9	1/4½
Sunderland	1/9	1/4½
Sutton Coldfield	1/5½	1/1½
Swaffham	1/7	1/2½
Swanage	1/9	1/4½
Swansea	1/7½	1/3
Swindon	1/8½	1/3½
Tamworth	1/7½	1/3
Taunton	1/7	1/2½
Tenterden	1/9	1/4½
Thames Haven	1/6½	1/2½
Thetford	1/8½	1/3½
Thorpe Bay	1/9	1/4½
Todmorden	1/7½	1/3
Tonbridge	1/8½	1/3½
Torquay	1/7	1/2½
Totnes	1/6	1/2
Trowbridge	1/6½	1/2½
Truro	1/7½	1/3
Tunbridge Wells	1/7½	1/3
Uppingham	1/7½	1/3
Uttoxeter	1/9	1/4½
Wakefield	1/9	1/4½
Walsall	1/9	1/4½
Walsden	1/7	1/2½
Walton-on-Naze	1/8½	1/3½
Ware	1/6	1/2
Warminster	1/9	1/4½
Warrington	1/9	1/4½
Warwick	1/8½	1/3½
Wellingborough	1/8	1/3½
Welwyn	1/9	1/4½
Welwyn Gar. City	1/5½	1/1½
Wells (Norfolk)	1/9	1/4½
West Bromwich	1/8½	1/3½
Westcliff-on-Sea	1/8	1/3½
Weston-super-Mare	1/8	1/3½
Weybridge	1/7	1/2½
Weymouth	1/8	1/3½
Whitby	1/7	1/2½
Whitstable	1/9	1/4½
Widnes	1/9	1/4½
Wigan	1/7½	1/3
Wigton	1/9	1/4½
Willington	1/9	1/4½
Wilmslow	1/7½	1/3
Winchester	1/7½	1/3
Windermere	1/8	1/3½
Windsor	1/6½	1/2½
Wisbech	1/7	1/2½
Witham	1/7½	1/3
Woking	1/7	1/2½
Wokingham	1/9	1/4½
Wolverhampton	1/6½	1/2½
Woodbridge	1/8½	1/3½
Worcester	1/7½	1/3
Workington	1/8½	1/3½
Worksop	1/7	1/2½
Worthing	1/8½	1/3½
Wrexham	1/6½	1/2½
Wroxham	1/8	1/3½
Wycombe	1/6	1/2
Wymondham	1/7½	1/3
Yeovil	1/9	1/4½
York		

* Painters 1d. less than other Craftsmen. † Plus 2d. per working day. ‡ Plasterers 1/11½.

¶ Tradesman's Labourers 1/5½. Navvies and General Labourers 1/4½.

§ Joiners, Plumbers, Bricklayers, Tilers and Masons receive 2/- per week or 4d. per day Tool Money.

For Building Trade Wages in Scotland, see page 322.

PRICES CURRENT OF MATERIALS *

Note: Owing to the exceptional circumstances which prevail at the present time prices of materials should be confirmed by inquiry. The prices for soft woods are for cash on delivery, and are subject to adjustment when the increased price of £22 per standard for national released stocks is finally fixed. At present linseed oil and genuine spirits of turpentine can only be supplied in cans in small quantities.

BRICKS, &c.

Delivered to site, City and Central Area, Full Lorry Loads. £ s. d.
Best Stocks 4 18 0
Second Hard Stocks 4 11 0

Per 1,000. Delivered at London Goods Stations.

2⅝ in. Phorpres. A discount of 6d. 1,000 only monthly account.	King's Cross Station per 1,000. s. d.	To sites in W.C. District. per 1,000 s. d.
Pressed bricks	51 0	57 0
Cellular bricks	51 0	57 0
Keyed bricks	53 0	59 0
Cellular Keyed bricks	53 0	59 0
Rustic bricks	71 0	77 0
Cellular Rustic bricks	71 0	77 0
Single Bullnose	71 0	77 0
White bricks	71 0	77 0
White Midhurst Facing Bricks (delivered London site)		3 12 6
Best blue Pressed Staffs. (London Stns.)		8 18 0
Do. Bullnose (London Stns.)		9 8 0
Blue Wire Cuts (London Stns.)		7 15 6

B.st Stourbridge Fire Brick (London Stns.):—
2½ in. ..... 8 0 0 3 in. 9 15 0

GLAZED BRICKS. (London Stns.)

Best White Ivory and Salt Glazed Stretcher	26 0 0	D'ble Str'tch'rs	34 10 0
		D'ble Headers	31 10 0
		One side & two ends	35 10 0
Headers	25 10 0	Two sides & one end	36 10 0
Quoins, Bullnose and 4½ in. Flats	32 10 0	Splays and Squints	34 0 0

Second Quality, £2 per 1,000 less than best. Cream and buff, £2 extra over white. Other colours. Hard Glaze, £5 10s. extra over white.

PARTITION SLABS.

Delivered London Area.

"PHORPRES" HOLLOW PARTITION BLOCKS.

2" per yd. sup.	2 3	3" per yd. sup.	2 9
2½" " "	2 6	4" " "	3 1

CLINKER CONCRETE.

2" per yd. sup.	1 6	3" per yd. sup.	2 0
2½" " "	1 8	4" " "	2 4

CRANHAM TERRA COTTA.

2" per yd. sup.	3 0	3" per yd. sup.	3 8
2½" " "	3 6	4" " "	4 7

HEMPSTEAD—KEYED TWO SIDES.

12" x 9" x 2"	2 6	12" x 9" x 3"	3 0
12" x 9" x 2½"	2 9	12" x 9" x 4"	3 9

Per yard super d/d. Free on site, London.

SAND.

Thames Ballast	7	9 per yd.	delivered 2 miles radius Paddington.
Pit Ballast	7	3 " "	
Pit Sand	9	9 " "	
Washed Sand	10	9 " "	
¾ in. Shingle	8	0 " "	
¾in. Broken Brick	12	0 " "	
Pan Breeze	8	3 " "	

CEMENT.

Best British Portland Cement. Standard Specification delivered London Area. £ s. d.
4 ton loads and upwards site ..... Per ton 2 4 6
1 ton to 4 tons site 2 7 6
Alongside Vauxhall in 80 ton lots 2 2 0
"Ferrocrete" Rapid Hardening Cement—
4 ton loads and upwards site 2 10 6
1 ton to 4 tons site 2 13 6
Alongside Vauxhall in 80 ton lots 2 8 0
Stored in Reserved Bins at works. 1/6 per ton extra.
"Aquacrete" Water Repellent, "Blue Circle" cement, 30/- per ton extra or ordinary "Blue Circle" prices.
"Colorcrete" Nos. 1 and 2. Coloured Rapid Hardening Portland Cement 3 14 6
"Colorcrete" not rapid hardening, according to colour, from £7 to £15 10s. per ton.
"Snowcrete" White Portland Cement 9 5 0
Super Cement (Waterproof) 3 14 6

NOTE.—Paper bags will be charged at the rate of 5/- nett per ton. Jute sacks charged 1s. 9d. nett each and 1/6 nett each allowed if returned to works within two weeks, in good condition.
Carriage will be paid by makers on returned empty jute sacks.
Roman Cement £7 5 Keene's Cement, White £6 10 0
Parian Cement 6 10 " " Pink 6 5 0
Cementone Colours for cement according to tints per cwt. from £2 16s. 0d.

PLASTER.

	£ s. d.		£ s. d.
Coarse, Pink	3 12 6	Sirapite, Coarse	4 3 0
" White	4 0 0	" Finish	4 11 0
Pioneer	4 3 0		

Above prices for 4-ton loads and over London Area.

Best Ground Blue		Grey Stone Lime	2 10 0
Lias Lime	2 15 0	Chalk Lime	2 10 0
Granite Chippings	1 10 0	Hair per cwt.	2 7 6

NOTE.—Sacks are charged 1s. 9d. each, and credited 1s. 6d., if returned in good condition within three months, carriage paid.
Stourbridge Fireclay in sacks 37s. per ton at rly. dep.

STONE.

BATH STONE.—Delivered in railway trucks at Westbourne Park, Paddington, G.W.R., or South Lambeth, G.W.R., per ft. cube ..... s. d. 2 11½
BEER STONE—RANDOM BLOCK—
Free on rail at Seaton Station. per ft. cube 2 3
Delivered free on rail Nine Elms, S.R. " 3 1½
Selected approximate size one way, 1d. per cubic ft. extra, selected approximately three sizes or for special work, 3d. per cubic ft. extra.

PORTLAND STONE— s. d.
Brown Whitbed, in random blocks of 20 ft. average, delivered in railway trucks at Nine Elms, S. Rly., South Lambeth Station, G.W.R., and Westbourne Park, Paddington, G.W.R., per ft. cube 4 6
Do. do. delivered on road waggons as above stations, per ft. cube 4 6
White basebed, 3d. per ft. cube extra.
NOTE.—1d. per ft. cube extra for every ft. over 20 ft. *average* and ¼d. beyond 30 ft.
HOPTON-WOOD STONE—
F.O.R. Quarries, Wirksworth, Derbyshire, Random blocks from 10 ft. and over P.ft.cb. 14 0
Sawn two sides 22 6
HOPTON-WOOD STONE—
Sawn three or four sides 27 9
YORK STONE, BLUE—*Robin Hood Quality.*
Delivered at any Goods Station, London.
6 in. sawn two sides landings to sizes (under 30 ft. super) ..... per ft.super 5 6
6 in. rubbed two sides, ditto ... " 6 3
3 in. sawn two sides slabs (random sizes) ..... " 2 7
2 in. to 2½ in. sawn one side slabs (random sizes) (paving) ..... " 1 8½
1½ in. to 2 in., ditto ..... " 1 4½
HARD YORK—
Delivered at any Goods Station, London.
Scrappled random blocks ..... per ft. cube 6 10
6 in. sawn two sides landings to sizes (under 40 ft. super) ..... per ft.super 5 7½
6 in. rubbed two sides, ditto .... " 6 9
4 in. sawn two sides slabs (random sizes) ..... " 3 5
3 in. ditto ditto ..... " 2 8
2 in. self-faced random flags ..... Per yd. super 8 9

CAST STONE.

Delivered in London are in full van loads, per ft. cube: Plain, 7s. 6d. Moulded, 8s. 6d. Sills, 10s. 0d.

HARD WOOD.

1 INCH AND UP THICK.

Average price for prime quality.	£ s. d.
Dry Austrian Wainscot, per ft. cube	0 17 0
Dry American and/or Japanese Figured Oak, per ft. cube ..... 10 6 to	0 13 0
Dry American and/or Japanese plain Oak, per ft. cube	0 11 6
Dry sq. edged Honduras Mahogany, per ft. cube	0 15 0
Dry log-cut Honduras Mahogany, per ft. cube ..... 12 6 to	0 16 0
Dry Cuba Mahogany, per ft. cube	0 18 0
Dry Teak, per ft. cube	0 14 0
Dry American Whitewood, per ft. cube	0 10 6
Dry Australian Walnut, per ft. cube	0 19 0
Dry Queensland Silky Oak, per ft. cube	0 12 6
Dry African Mahogany, per ft. cube	0 10 0
Dry African Whitewood, per ft. cube	0 8 0
Dry English Wainscot Oak, per ft. cube	0 16 0
Best Scotch Glue, per cwt.	3 0 0
Liquid Glue, per cwt. ..... 4 7 0 to	5 10 0

SOFT WOOD.

MERCHANTABLE BRITISH COLUMBIAN PINE.

	Minimum. £ s. d.	Maximum. £ s. d.
Scantlings in imported sizes, 2in. by 3in. to 4in. by 11in.	43 10 0	53 0 0

Having secured the Contract— What about the Steel Scaffolding?

TUBULAR

—S & C—

SCAFFOLDING

For the lowest Prices apply to the Oldest Firm in The Scaffolding Trade.

STEPHENS & CARTER LTD.

The British Steel Scaffolding Co.

731-761, HARROW RD., N.W.10.

Telephone No. Ladbroke 1191 (6 lines).

PLANED BOARDS.

PRIME CLEAR BRITISH COLUMBIAN PINE.

	Per standard. £ s. d.
1in. by 11in. } 1in. by 9in. }	67 10 0
	Per square. s. d.
1in. plain edge flooring	53 0
1¼in. ditto	66 6
1in. tongued and grooved	53 0
1¼in. ditto	66 6

MATCHING.

	Per square. s. d.
¾in.	37 6
¾in.	42 0
1in.	55 0

SLATES.

First quality slates from Penrhyn or Portmadoc, carriage paid in full truck loads to London Rate Station. Per 1,000 actual.

	£ s. d.		£ s. d.
24 by 12	31 13 6	18 by 10	16 15 0
22 by 12	26 12 0	18 by 9	15 7 6
22 by 11	23 18 6	16 by 10	14 11 6
20 by 12	23 8 0	16 by 8	11 10 0
20 by 10	21 0 0		

TILES.

Delivered at London rate stations in full truck loads of not less than 6 tons ..... Per 1,000 f.o.r. London

Best machine-made tiles from Broseley or Staffordshire district	£4 10 0
Ditto hand-made ditto	5 7 6
Ornamental ditto	5 12 6
Hip and valley tiles (per dozen) Hand-made	0 9 0
Machine-made	0 s 6

METALS.

JOISTS, GIRDERS, &C., TO LONDON STATION PER TON—

R.S. Joists, cut and fitted	£19 5 0
Plain Compound Girders	21 15 0
" Stanchions	24 5 0
In Roof Work	28 15 0

NOTE.—These prices are for standard pieces and no special pieces of an awkward nature.
MILD STEEL ROUNDS.—To London Stations, per ton.

Diameter.	£ s. d.	Diameter.	£ s. d.
½ in.	19 15 0	⅝ in. to ½ in.	18 5 0
⅜ in.	18 15 0	⅝ in. to 2¼ in.	17 15 0

WROUGHT TUBES AND FITTINGS.
Deliveries from works.
Deliveries from London stock further 2½% gross.
Fittings.
10/17

	Tubes. ½"/6" %	Tubulars. and ½"/6" %	19/24 %	Flanges. ½"/2" %	2½"/6" %
Light weight	55½	—	48	51½	58
Heavy weight	48½	48½	40½	41½	50½
Gavl.lightweight	44½	—	39½	40½	49½
Galv.heavyweight	35½	35½	31½	30½	41½

Tubes and tubulars sizes ⅛"/⅜" inclusive, charged extra of 5% less gross.
Fittings. Figs. 25/34 5% less gross discount.
Terms.—Nett cash end of month following date of invoice. Carriage paid on lots of £10 nett value and over.

C.I. HALF-ROUND GUTTERS—London Prices ex Works.

per yd. in 6 ft. lengths.	Gutters.	Angles and Nozzels.	Stop Ends.
3 in.	1/3¾	1/0¾	4d.
3½ in.	1/5	1/2½	4d.
4 in.	1/5	1/3½	5½d.
4½ in.	1/6	1/6	6½d.
5 in.	1/9¼	1/7½	7½d.

O.G. GUTTERS.

3 in.	1/8¼	1/5½	4½d.
3½ in.	1/10½	1/5½	5½d.
4 in.	1/10½	1/6	6½d.
4½ in.	1/11½	1/9	7½d.
5 in.	2/5½	2/-	9d.

RAIN WATER PIPES, &c.

Per yd. in 6 fts.	Pipe.	Bends, stock angles.	Branches. stock angles.
2 in.	1/11½	1/3½	1/11½
2½ in.	2/0½	1/6	2/3½
3 in.	2/5	1/10½	2/9½
3½ in.	2/10½	2/3	3/3
4 in.	3/3½	2/8½	3/11½

NETT PRICES.
Tonnage allowance—4-ton lots, 5 per cent.
2-ton lots, 2½ per cent.
L.C.C. COATED SOIL PIPES—London Prices, ex Stock.

	Pipe.	Bends, stock angle.	Branches. stock angles
2 in. per yd. in 6 fts.	3/3½	2/3½	2/9½
2½ in. "	3/11½	2/6½	3/6
3 in. "	4/2½	2/9½	4/2½
3½ in. "	4/3½	3/6	4/10½
4 in. "	4/8½	3/11½	5/7½

L.C.C. COATED DRAIN PIPES.—London Prices, ex Stock.

	Pipe.	Bends, stock angles.	Branches. stock angles
3in. per yd. in 9ft. lengths cwt. qr. lbs.	5/1	5/11½	9/5½
4 in. " 1 1 20	7/6	6/9	11/10½
5 in. " 1 2 22	9/1	12/2	18/5
6 in. " 2 0 6	10/9	14/0½	23/0

Gaskin for jointing 65/- per cwt.

* The information given on this page has been specially compiled for THE BUILDER, and is copyright. The aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the highest or lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information. Prices are subject to 2½ per cent. cash discount.

PRICES CURRENT OF MATERIALS—(contd.)

	Per ton basis in London. £ s. d.		£ s. d.
IRON.—Staffordshire Crown, Merchant quality	16 12 6	to	17 17 6
IRON—Staffordshire Marked Bars	19 10 0	to	21 10 0
Mild Steel Bars	17 8 6	to	18 18 6
Mild Steel Hoops	19 2 6	to	19 12 6
	Ex Merchant's Stock, per ton (two-ton lots).		
Soft Steel Sheets, C.R. and C.A.—	£ s. d.		£ s. d.
20 gauge	21 10 0	to	23 17 6
24 gauge	21 15 0	to	23 12 6
26 gauge	22 10 0	to	24 7 6
Galvanised Corrugated Sheets, 6 ft. to 9 ft.—			
20 gauge	23 11 3	to	24 16 3
24 gauge	24 1 3	to	25 6 3
26 gauge	25 6 3	to	27 1 3
Galvanised Flat Sheets, C.R. and C.A.—			
20 gauge	25 1 3	to	26 18 9
24 gauge	25 11 3	to	27 8 9
26 gauge	26 16 3	to	28 13 9
	Per ton. £ s. d.		£ s. d.
Cut Nails, 3 in. and up	23 10 0	to	25 0 0

ALL NETT.

METAL WINDOWS.—Standard sizes, suitable for complete houses, including all fittings, painting two coats, and delivery to job, average price about 1s. 4d. to 1s. 7d. per foot super.

COPPER.

		s. d.
Seamless Copper tubes (basis)	per lb.	1 1
Strong sheet	,,	1 3
Thin	,,	1 4
Copper nails	,,	1 3
Copper wire	,,	1 3

PLUMBERS' BRASS WORK.

Delivered in London.
Stamped by Met. Water Board.

CRUTCH HEAD SCREW DOWN BIB COCKS FOR IRON. EASY CLEAN.

½ in. ¾ in.
29/- 45/- per doz.

CHROMIUM PLATED TOILET SCREW DOWN BIB COCKS FOR IRON. EASY CLEAN.

½ in. ¾ in.
40/— 59/- per doz.

SCREW DOWN STOP COCKS FOR IRON.

½ in. ¾ in. 1 in. 1¼ in. 1½ in. 2 in.
31/- 44/6 75/- 175/- 250/- 396/- per doz.

SCREW DOWN STOP COCKS WITH TWO UNIONS FOR LEAD.

½ in. ¾ in. 1 in. 1¼ in. 1½ in. 2 in.
42/6 65/- 102/- 195/- 210/- 510/- per doz.

DOUBLE NET BOILER SCREWS.

½ in. ¾ in. 1 in. 1¼ in. 1½ in. 2 in.
7/6 9/- 14/- 24/- 37/6 54/- per doz.

HEAVY CROYDON BALL VALVES.

½ in. ¾ in. 1 in. 1¼ in. 1½ in.
33/6 55/6 85/- 165/- 237/- per doz.

CAPS AND SCREWS.

1¼ in. 1½ in. 2 in. 3 in. 3½ in. 4 in.
9/- 11/- 16/6 29/- 42/- 45/- per doz

BRASS FERRULES OF SLEEVES.

1¼ in. 2 in. 3 in. 3½ in. 4 in.
9/6 11/6 20/6 26/- 37/- per doz.

DRAWN LEAD TRAPS WITH BRASS CLEANING SCREWS.

	1¼ in.	1½ in.	2 in.	3 in.	
8 lb. Lead P.	17/6	23/-	32/6	66/6	per doz.
8 lb. Lead S.	21/6	27/6	39/6	73/-	per doz.

SOLDER.—Plumbers, 1/2. Tinmen's, 1/4. Blow pipe, 1/6 per lb.

PAINTS, &c.

		£ s. d.
Raw Linseed Oil, in drums	per gallon	0 5 4
Boiled ,, ,, in drums	,,	0 5 7
Turpentine, in drums (10 gals.)	,,	0 5 3
Genuine Ground English White Lead, per ton (In not less than 5-cwt. casks).		61 0 0

Extra for 1-cwt. kegs over 5-cwt. casks is 2/9 cwt.

GENUINE WHITE LEAD PAINT "Father Thames," "Nine Elms," "Park," "Supremus," "St. Paul's," "Morganswyte," "Polacco," "J" Brand, and other best brands (in 14 lb. tins) not less than 5-cwt. lots

	£ s. d.
per ton delivered	83 10 0
Red Lead. Dry (packages extra) .. per ton	52 0 0
Best Linseed Oil Putty (1 ton lots) per cwt.	0 17 1½
Size. XD quality	fkn. 0 3 6

Turpentine substitute can be obtained and prices vary according to the quality from 2/9 gallon upwards.

VARNISHES, &c.

		Per gallon.
Oak Varnish	Outside	0 14 0
Fine do.	,,	0 16 0
Fine Copal	,,	0 18 0
Pale Copal	,,	1 0 0
Pale Opal Carriage	,,	1 4 0
Best do.	,,	1 12 0
Floor Varnish	Inside	0 18 0
Fine Pale Paper	,,	0 18 0
Fine Copal Cabinet	,,	1 2 0
Fine Copal Flatting	,,	1 0 0
Hard Drying Oak	,,	0 18 0
Fine Hard Drying Oak	,,	0 19 6
Fine Copal Varnish	,,	1 0 6
Pale do.	,,	1 12 0
Best do.	,,	1 2 6
Best Japan Gold Size		1 12 6
Best Black Japan		0 10 0
Oak and Mahogany Stain (water)		0 12 0
Brunswick Black		0 7 6
Berlin Black		0 14 0
Knotting (patent)		0 15 0
French and Brush Polish		0 12 0
Liquid Dryers in Terebene		0 9 0
Cuirass Black Enamel		0 7 0

GLASS.

ENGLISH SHEET GLASS IN CRATES OF STOCK SIZES.

ORDINARY GLAZING QUALITY (O.Q.) AND SELECTED GLAZING QUALITY (S.Q.).

PER FOOT SUPER.

In sizes not exceeding 80 in. long or 48 in. wide or 110 united inches.

	O.Q.	S.Q.
18 oz. in 300 ft. cases	2½d.	2¾d.
24 oz. ,, 200 ft. ,,	3½d.	4d.
26 oz. ,, 200 ft. ,,	3¾d.	4⅓d.
32 oz. ,, 200 ft. ,,	5⅓d.	6⅓d.
24 oz. ,, 300 ft. ,,	3⅓d.	3⅔d.
26 oz. ,, 300 ft. ,,	3⅔d.	4⅓d.
32 oz. ,, 300 ft. ,,	5⅓d.	6⅓d.
18 oz. Obscured Sheet		5⅓d.
24 oz. Obscured Sheet		6⅓d.
Fluted, 21 oz.		9d.
Enamelled, 18 oz.		5⅓d.
,, 24 oz.		6⅔d.

Extra price according to size and substance for squares cut from stock.

ENGLISH ROLLED PLATE AND FIGURED CATHEDRAL, ETC., IN CUT SIZES. Per ft.

Rolled plate, ⅛ in.	5⅓d.
Rough cast double rolled, 1/16 in.	6⅓d.
Rough cast double rolled, ⅛ in.	6⅔d.
Figured rolled, and Cathedral, white	6⅓d.
Figured rolled and Cathedral, tinted	9⅓d.
Rolled Sheet	6d.
Reeded, Broad Reeded, Cross Reeded and Chevron Reeded, ⅛ in. thick	0 10½

Rolled plate is the same price as rough cast double rolled.

	Per ft. s. d.
Wire Rolled, ⅛ in. thick	0 9½
Wired Cast, ⅛ in. thick	0 9½
Georgian Wired Cast	0 10
"Calorex" Sheet, 21 oz.	2 6
,, ,, 32 oz.	4 0
,, Cast, ⅛ in. thick	0 10
,, ,, 1/16 in. thick	1 0
,, ,, ¼ in. thick	1 2
Non Actinic Glass, ⅛ in. thick	0 9½
,, ,, ,, 1/16 in. thick	1 0
,, ,, ,, ¼ in. thick	1 2

"VITA" GLASS.

	Per ft. s. d.
"Vita" Plate Glass, about 1/16 thick:	
To 7 ft. super	5 0
Over 7 ft. super	7 6
"Vita" Sheet Glass, about 18/20 oz.	2 0
Cathedral "Vita" Glass:	
⅛" thickness	2 0
3/16" ,,	3 0
3/16" Georgian Wired "Vita" Glass	3 6

LEAD, &c.

(Delivered in London.)	Per ton. £ s. d.
LEAD.—Sheet, English, 4 lb. and up	34 10 0
Pipe in coils	34 0 0
Soil pipe	39 10 0
Compo pipe	41 5 0

NOTE.—Country delivery, 20/- per ton extra, lots under 3 cwt. 4/- per cwt. extra and over 3 cwt. and under 5 cwt., 2/6 per cwt. extra. Cut to sizes, 4/- per cwt. extra.

Old lead, ex London area, at Mills ..... per ton £19 10 0

BUILDING TRADE WAGES IN SCOTLAND

Following are grade rates authorised by the Scottish N.J.C. from October 1. Every endeavour is made to ensure accuracy, but we cannot be responsible for errors that may occur.

Grade Classification	A	A¹	A²	A³	B	B¹
Craftsmen	1/10	1/9½	1/9	1/8½	1/8	1/7½
Labourers	1/4½	1/4½	1/3½	1/3½	1/3	1/2¾

Aberdeen	A	Dumfriesshire	A²	Inverness	*	Perthshire	A²
Ayrshire	A	Dundee	A	Inverurie	A¹	Peterhead	A¹
Banff	B	Dunoon	A	Kincardineshire	A²	Renfrewshire	A
Berwickshire	A²	East Fife	A	Kinross-shire	A	Rothesay	A
Bridge of Allan	A	East Lothian	A	Lanarkshire	A	Roxburghshire	A²
Broughty Ferry	A	Edinburgh	A	Midlothian	A	St. Andrews	A
Clackmannanshire	A	Fifeshire	A	Monifieth	A	Selkirkshire	A²
Doune	A	Forfarshire	A²	Moray and Nairn	B	Stewartry	A²
Dunblane	A	Glasgow	A	Newport	A	Stirlingshire	A
Dumbartonshire	A	Greenock	A	Peeblesshire	A²	Stornoway	A²
Dumfries	A¹	Hamilton	A	Perth	A	Tayport	A
						West Lothian	A

* This town has its own rates: Masons, 1/8; Carpenters, 1/8; Slaters, 1/8; Plumbers, 1/8½; Plasterers, 1/9, but 1/9½ is paid owing to the scarcity at present; Painters, 1/8 and Labourers, 1/3½.

The information given in this table is copyright. Rates of wages in England and Wales are given on page 320.

SLIDING DOOR GEAR
British Made.
Phone: WATERLOO 4311 (3 lines)
Phone: WATERLOO 4311 (3 lines)
MECHANICAL PERFECTION
COBURN SYSTEM
Latest Catalogue on Request.
THE BRITISH TROLLEY TRACK CO., LTD.
Orange Street, S.E.1.
Agents Everywhere.

THE SCOTTISH BUILDER

NEW BUILDINGS

BRECHIN.—HOUSES.—The T.C. has received from the Department of Health agreement to the building of 22 new houses of three and four rooms for workers.

DALKEITH. — EXTENSIONS. — Are to be made at Dicks-buildings, for the Scottish Motor Transport Co., Ltd., of Edinburgh.

ELGIN.—EXTENSIONS.—The County Hospital of Moray and Nairn is to be extended, at £6,400. Mr. J. Findlay, County-buildings, Elgin, is the County Architect.

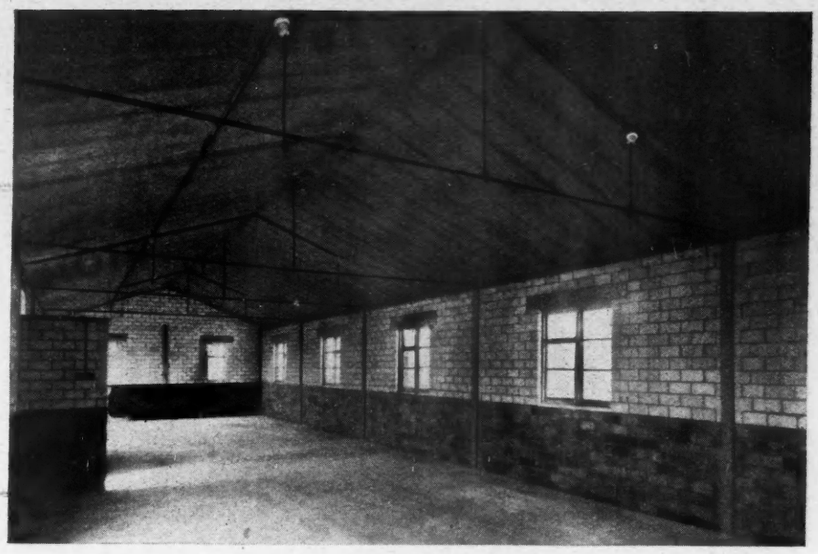
GLASGOW.—PREMISES.—Plans have been prepared by their own architectural staff for new buildings, for Messrs. David Bennie and Sons, Ltd.

GLASGOW.—BUILDING.—The Corporation has authorised Mr. G. Morgan, electrical engineer, Corporation Electricity Offices, Waterloo-street, Blythswood, to proceed with electricity work, at £4,458.

MONTROSE.—ADDITIONS.—The managers of Montrose Royal Asylum approved a further sum of £6,000 in connection with the building and grounds of Angus House, and £800 further in connection with the building and grounds of the chapel and mortuary.

Scottish Building Wages.

The Scottish National Joint Council for the Building Industry has reviewed the wages payments now in force under the War Emergency Agreement, and has resolved: That in accordance with the Agreement of November 23, 1939, and under Rule 7 of the Scottish National Joint Agreement, the current standard rate of wages shall be adjusted by an increase of ½d. per hour, the corresponding labourers' rates being adjusted proportionately as provided in the rules. The new rates are incorporated in the table on this page.



NEW ARMY HUT. SHOWING THE BISON (PRE-CAST CONCRETE) ROOF IN POSITION.

TRADE NEWS

Concrete Roofs for New Army Camps.

We are informed that since it was approved by the War Office three months ago, Bison roofing, because of the speed with which it can be erected, is being widely used in the building of huts for the Army. It is made of hollow pre-cast concrete units, with cavities formed by the pneumatic core method controlled by Concrete, Ltd., of Leeds and London.

In the erection of the Bison roof no rafters or purlins are required. The pre-cast hollow slabs are merely laid in position between the gutter beams and the apex of the hut, and are trussed by tie and sag bars. Hence the speeding up of the laying of the roofs.

In one new camp, huts, each 19 ft. by 60 ft., were roofed at the rate of one a day.

Bison roofs are made by mass production methods and are designed for spans of 19 ft., 24 ft. and 28 ft., as well as for composite roofs of these spans with valley gutters.

In order to cope with the demand for the new roofing and their other pre-cast products, Concrete, Ltd., have recently opened additional factories and have greatly extended their existing works in Leeds and London.

OFFICIAL NOTIFICATION

Fire Watchers.

The Minister of Home Security has made an Order under the Defence Regulations providing that a fire watcher shall be present at all times in all premises in which more than 30 persons work. This Order applies in addition to any premises, whether or not more than 30 persons work therein, the whole or any part of which is used as a warehouse of greater capacity than 50,000 cubic feet, and any saw mill or timber yard containing more than 50,000 cubic feet of timber. The Order does not apply to a warehouse when it is empty or to premises which form part of any mine or quarry.

During the period in which a hostile attack is in progress in the vicinity, or an air-raid warning is in operation, the person who has undertaken to act as fire watcher must be in readiness to attack an outbreak of fire and summon assistance, and to use such fire-fighting appliances as may be available. The person responsible under the Order for seeing that it is carried out is the occupier of the premises.

Any two or more occupiers of different parts of the same premises may arrange to provide one fire watcher for the whole building.

NEW COMPANIES

THE particulars quoted below have been compiled by Messrs. Jordan & Sons, Ltd., Company Registration Agents, of 116 and 117, Chancery-lane, W.C.2, from the documents available at the Companies Registry.

D. PELL AND CO., ETD. (363206).—Registered September 12. 4, Broad-street-place, E.C.2. Consulting, structural and general engineers, founders, etc. Nominal capital: £100 in £1 shares.

STAFFORDSHIRE STEEL CONSTRUCTION CO., LTD. (363219).—Registered September 12. 84, Bishopsgate-street, Birmingham. Nominal capital: £1,000.

H. C. MORRISON AND CO. (RUISLIP), LTD. (363211).—Registered September 12. 62, Park-way, Ruislip, Middlesex. Air raid shelters, etc. Nominal capital: £100.

BOYD AND CORBETT, LTD. (363250).—Registered September 16. High Bridge House, High Bridge, Newcastle-on-Tyne. Builders, contractors, etc. Nominal capital: £200.

J. W. STRATTON, LTD. (363119).—Registered September 5. 18, Broadway-chambs., W.6. Builders, contractors, etc. Nominal capital: £1,000. J. W. Stratton, 34, Chiltern-dr., Surbiton.

DON'T TENDER UNSUCCESSFULLY

SECURE CONTRACTS WITH

BEITH SKEW

THE STEEL SCAFFOLDING CO., LTD.

"BIG BEN TOWERS." 23, OATLANDS DRIVE. WEYBRIDGE, SURREY.

'Phone: Walton-on-Thames 614 and 615.

TENDERS

The Editor welcomes authentic information for this feature from architects, surveyors or contractors. Items should reach 4, Catherine-street, Aldwych, W.C.2, not later than Wednesday morning.

Tenders for A.R.P. work will be found under "A.R.P. Schemes."

* Denotes *accepted.*
† Denotes *provisionally accepted.*
‡ Denotes *recommended for acceptance.*
§ Denotes *accepted subject to modification.*
¶ Denotes *accepted by H.M. Government departments.*

Alnwick.—Painting institution for Guardians: *Adam Robertson & Son, Alnwick, £149.

Anglesey.—Painting work at Rhosneigr council school, for E.C.: *R. J. Taylor, Llanrhyddlad, Anglesey.

Birmingham.—Works additions for Newey & Taylor, Ltd. E. McKie, M.I.Mech.E., architect, Norwich Union-chams., Congreve-st.: *J. Webb, Coseley, Staffs.

Cheshunt.—40 communal shelters, for U.D.C.:—

Name.	No. prepared to construct.	Amount for 40 shelters. £ s. d.
*Trout & Dilloway...	20	3,517 18 10
*F. J. Mold	14	3,983 18 0
*W. T. E. Duncan...	5	4,083 5 0
		4,300 5 0
Winton Hayes, Ltd.	40	4,806 17 7
Samson Products, Ltd.	10	4,937 13 6
G. J. Anderson ...	8	5,110 0 0
Ernest Knifton, Ltd.	42	5,532 0 0
		6,268 0 0
A. E. Wright, Ltd.	20	6,905 10 0
J. A. Perriss, Ltd.	40	9,233 0 0

Conisborough.—Electric lighting units at isolation hospital, for Doncaster and Mexborough Joint Hospital Board. J. A. Williams, S., Doncaster R.D.C., Nether Hall, Doncaster: *I. Pearson & Son, Riverside-wks., Cherry-la., Marshgate, Doncaster, £136 18s.

Croydon.—Drainage repairs at Warlingham Park hospital, for C.B.: *Economic House Drainage Repair Co., Ltd., £1,627 2s. 6d.

Glasgow.—Reconstruction, etc., of clinic. T. Somers, architect, Office of Public Works, Municipal-bldgs.: Contractors, *D. Livingstone & Son, Ltd., Glasgow.

Glasgow.—Work at gas works. J. McCluskie, Gas E.: Resheathing oxide department, *Adam Lyon, Glasgow, £412 3s.

Glasgow.—Painter work on St. Michael's school, for T.C. J. MacNab, architect, 129, Bath-st., Blythswood: *J. Hodgins & Sons, Glasgow, £395 19s. 5d.

Glasgow.—Extensions for W. Beardmore & Co., Ltd., Parkhead. W. E. Dickie, architect, Duke-st: Excavation, brick and mason, *J. Emery & Co., Ltd., Glasgow.

Jarrow-on-Tyne.—Renewal of gangways and pontoons, for T.C. J. S. Weir, B.E.: *Palmers (Hebburn), Ltd., Hebburn-on-Tyne. (Subject to M.T. consent.) Cost, about £15,000.

¶London (Air Ministry).—Contracts placed to the value of £500 or over for the week ended Sept. 14:—

Civil engineering work: Simms, Sons & Cooke, Ltd., Sherwood, Notts; A. M. Carmichael, Ltd., Edinburgh; Tarmac, Ltd., Wolverhampton; and Constable, Hart & Co., Ltd., London.

Building work: McLaughlan & Harvey, Ltd., Belfast; J. Mowlem & Co., London; Sir Robt. MacAlpine & Son, Ltd., Liverpool; and Gee, Walker & Slater, Ltd., London.

Building and civil engineering work: George Wimpey & Co., Ltd., London; and Pitchers, Ltd., London.

¶**London (War Dept.).**—Contracts for week ended Sept. 14 :—

Derbyshire : Constructional work, A. Holmes & Sons, Ltd., 811-813, London-rd., Derby.

Yorkshire : Hutting, R. Cleminshaw, Ltd., 103, West-parade, Hull; and hutments (two contracts), Thos. Feather & Co., Ltd., 14, Highfields-rd., Six Lane Ends, Idle, Bradford.

Dorset : Hutments, Staverton Builders, Staverton, Totnes.

Buckinghamshire and Oxfordshire : Hutting, Foster & Dicksee, Ltd., Rugby; and H. J. & A. Wright, Ltd., Great Missenden.

Berkshire and Gloucestershire : Hutting, G. H. Dibblin, 262a, Warwick-rd., Banbury.

Lancashire : Building work, The Leyland Construction Co., Ltd., Leyland.

Herefordshire : Hutting, F. R. Hipperson & Son, Ltd., 6, Broad-st.-pl., London, E.C.2.

Surrey and Berkshire : Hutting, Bartley & Ward, Ltd., High-st., Crawley.

Roxburghshire : Miscellaneous works, Adam Scott & Son, 1, Bourtree-terr., Hawick.

Berkshire : Miscellaneous works, C.T. Corps, Reliance Building Works, Walnut Tree Close, Guildford.

Hampshire : Heating installation, Wm. E. Ford, 127, High-st., Beckenham.

Macclesfield.—Laying of 580 yds. lin. of 6-in. dia. glazed stoneware pipes and 120 yds. lin. of 6-in. cast-iron pipes, manholes, etc., for R.D.C. J. H. Walters, 19, Moody-st., Congleton : *T. Gosling & Sons, Ltd., London-rd., Hazel-grove, £647.

Manchester.—Works additions for Thomas French & Sons, Ltd. H. S. Fairhurst & Son, architects, 55, Brown-st. : *W. Thorpe & Son, Ltd., Chester-rd., Cornbrook, Manchester.

Manchester.—Office, canteen and conveniences to works, for Richard Johnson & Nephew, Ltd. : *J. Gerrard & Sons, Ltd., Pendlebury-rd., Swinton, Manchester.

Manchester. — Smithy, foundry and mechanic's shop to works, for G. Garner & Sons, Ltd. : *Thompson & Brierley, Ltd., Union Saw Mills, Bury.

Manchester.—Additions to works, for W. Riley, Ltd. : *Moston Brick and Building Co., Ltd., Kenyon-la., Moston, Manchester.

Matlock.—Extensions to Sydnope Hall, for Trustees : *Henry Boot & Sons, Ltd., Banner Cross Hall, Sheffield.

Newcastle-on-Tyne.—Six months' housing repairs, for the City Council : Slating and tiling repairs, *Kirk & Dickinson, Ltd., New Bridge-st., Newcastle, £450; electrical repairs, *Graham Berrie, Normanton-terr., Newcastle, £150; repairs to iron fencing and gates, *Allan Liddle, Shields-rd., Newcastle, £100.

Redditch.—100 houses, for T.C. : L. O. Wilkes, B.S., The Council House : *S. J. Smith & Co. (Bidford), Ltd., Smith-rd., Wednesbury, £44,755.

Walsall.—New main entrance and staircase, remodelling lavatories on first floor, additional accommodation for kitchen and catering departments to Stork Hotel, Leicester-st., for Ind, Coope & Allsopp, Ltd., brewers, Burton-on-Trent. Plans prepared in own architectural dept., Brewery Offices : *T. H. Nicholls, 67, High-st., Walsall.

HOW TO PURIFY YOUR DRINKING WATER

THE following statement was broadcast recently by Lt.-Col. E. F. W. Mackenzie, O.B.E., M.C., M.B. (Director of Water Examination, Metropolitan Water Board).

Water undertakings throughout the country have taken all possible precautions to enable them to maintain a constant supply of pure water. In spite of this it is possible that, in places where air raids are severe, the water system may get damaged, and this may result in contamination of the water, or even in a temporary interruption of the supply. Should there be any doubt about the purity of the water supplied to your district you will be notified.

It is therefore important that you should know in advance what to do should the water supply become contaminated, or should you find it necessary to use impure or doubtful water from wells, ponds or streams.

Drinking impure water may cause illness. Typhoid fever is one of the diseases most likely to be spread in this manner. It is a serious disease, and should it occur the patients would occupy hospital beds which might be urgently required for other purposes.

It is therefore the duty of every citizen to learn to do what the Army already does—to purify impure water so that it will be safe to use for drinking, for preparing foods, and for washing utensils which are to be used for food or drink.

Well, how can you do this?

It is really quite a simple matter. Firstly, you can boil the water, and then it will be quite safe to use. But supposing you can't boil the water because the gas and electricity services have also been damaged, then there is another safe, quite harmless and simple method which you can use. It is used by the Army.

Keep in your house a bottle of chlorinated soda solution. Your chemist can supply you with it. Milton or Chlor-San will do as well. Buy also a small packet of photographic hypo. These materials are cheap and can be obtained from all chemists and many stores. On no account should you use any other disinfectant for purifying water, unless you are recommended to do so by a qualified chemist.

Now, to purify your water if you can't boil it, add ten drops of chlorine disinfectant to one pint of water. (Remember that a household tumbler holds half-a-pint). Stir or shake and allow to stand for not less than five minutes. Then add a crystal of hypo and stir until the hypo is dissolved. The water is then safe to drink. But remember this—after purifying the water, whether by boiling or by chlorine, keep it in a clean receptacle until required for use.

For washing utensils and foods which are to be eaten uncooked, such as salads and fruits, you will require to purify a larger quantity of water, and this may be done in a clean bucket. The ordinary bucket holds about two gallons of water. To purify a bucketful add two teaspoonfuls of the chlorine disinfectant and stir thoroughly. After standing for five minutes or longer, add two or three crystals of hypo. The same method may be used for purifying water in large containers, provided the disinfectant is added in the proportion of not less than one teaspoonful to a gallon of water, followed after the necessary five minutes' interval by sufficient hypo to remove the taste of chlorine.

The disinfectants I have mentioned have been chosen because they all contain chlorine, which, although it gives an unpleasant taste to the water, is quite harmless. The hypo is added only to remove the taste of the chlorine. If you add too much chlorine or hypo it doesn't matter; if too little hypo is used you will still taste the chlorine, and if you don't like it add another crystal of hypo. You must, however, remember to add the chlorine before the hypo.

The reason why you must not use disinfectants other than chlorine for the purification of water supplies, unless they are recommended for this purpose by a qualified chemist, is that many of them contain substances which are harmful, or which make the water taste unpleasantly.

I want you to get these substances at once, and to try out the method once or twice in your home just to assure yourself that it is perfectly simple and that you don't object to the taste.

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